

MONTHLY WEATHER REVIEW,

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(General Weather Service of the United States.)

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In preparing this REVIEW the following data, received up to September 13th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 132 Signal Service stations and 12 Canadian stations, as telegraphed to this office; monthly journals and means 143 and 156 respectively, from the former; reports from 37 Sunset stations; 213 monthly registers from Voluntary Observers; 17 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly reports from Voluntary Observers in, and the local Weather Service of Missouri; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

Upon chart No. II is shown by the isobaric lines the general distribution of atmospheric pressure, as reduced to sea-level, for the month. The barometric pressure, as compared with the means of the seven preceding years, shows that the mean of the entire country has been abnormally low. Cincinnati only shows a normal pressure. The average deficiencies for the various districts are as follows: New England, 0.08 inch; Middle Atlantic States, 0.06; South Atlantic States, from 0.05 on the coast to 0.02 in the interior; Gulf States, 0.07; Tennessee and Ohio valley, 0.02; Lower Lake region, 0.04; Upper Lake region, 0.045; Upper Mississippi and Lower Missouri valleys, 0.06; Northwest, 0.07; Rocky Mountain Slope, 0.035; San Diego, Cal., 0.10; San Francisco, Cal., 0.08; Portland, Or., 0.11.

The Local Barometric Ranges were as follows: California from 0.25 of an inch at San Diego to 0.48 at Red Bluff; Oregon from 0.51 at Roseburg to 0.63 at Olympia; Northern and Middle Plateaux from 0.59 at Salt Lake City to 0.63 at Boise City; Southern Plateau from 0.34 at Tucson to 0.55 at Phoenix; Rocky Mountain Slope from 0.31 at Pike's Peak and 0.40 at Fort Davis to 0.74 at Dodge City and 0.85 at Cheyenne; Rio Grande valley from 0.48 at Rio Grande City to 0.55 at Brackettville; Western Gulf States from 0.55 at Indianola to 0.91 at Shreveport; Eastern Gulf States from 0.26 at Key West to 0.45 at Mobile; South Atlantic States from 0.42 at Augusta to 1.05 at Cape Lookout; Middle Atlantic States, from 0.47 at Philadelphia to 0.99 at Kittyhawk and 1.22 at Cape Henry; New England States from 0.51 at Springfield to 1.05 at Eastport, 1.07 at Newport and 1.13 at Wood's Holl; Ohio valley and Tennessee from 0.51 at Columbus to 0.76 at Cairo; Lower Lake region from 0.46 at Toledo to 0.63 at Oswego; Upper Lake region from 0.50 at Chicago to 0.75 at Alpena; Upper Mississippi valley from 0.49 at Davenport to 0.64 at St. Paul; Red River of the North valley from 0.63 at Pembina to 0.67 at Breckenridge; Lower Missouri valley from 0.63 at Leavenworth to 0.69 at Yankton.

Areas of High Barometer.—No areas of high barometer of particular energy have passed over the country during the month, but the four following are the most important:

No. I.—This area was present off the North Carolina coast on the morning of the 1st—Cape Lookout and Cape Hatteras barometers 0.29 abnormally high. This pressure remained nearly stationary until the morning of 2nd. During this time fresh southeast to southwest winds, with partly cloudy weather and no rain, prevailed in the South Atlantic States, and fresh variable winds, mostly southerly, were reported from the Gulf States, with heavy rainfalls; that at St. Marks, amounting for the twenty-four hours ending at the afternoon report of the 1st, to 10.81 inches, being probably the heaviest ever reported from a Signal Service station in one day. On the 2d the pressure gradually dissipated, during which day fresh southerly winds, with cloudy weather and rain, generally prevailed in the South Atlantic States.

No. II.—At midnight of the 8th the area of high barometer, which had gradually appeared during the 7th and 8th in the extreme Northwest, was just within the limits of the Signal Service stations, and was central in Dakota—Breckenridge barometer 0.36 above the normal. Moving southeastwardly on the morning of the 9th it was central in the Lower Missouri valley—Leavenworth barometer 0.24 above the normal. On the morning of the 10th there was but slight change in the location of the center, but the area had extended eastward, and cool, clear weather prevailed over the whole country, except the Gulf States. A minimum temperature of 43° was reported at Saugeen. Its general path during the day was easterly; at the morning report it was central in Virginia—Lynchburg barometer 0.18 above the normal. By the morning of the 12th the area was passing off the North Carolina coast in advance of low area No. IV. This area induced minima temperatures generally in Texas, for parts of the Lower Lake region, generally in Tennessee, the Ohio valley, the Middle and South Atlantic States, and parts of New England.

No. III.—The afternoon of the 14th an area of high pressure suddenly appeared in the Upper Lake region. At midnight of that date the pressure at Bismarck was 0.17 above the normal. At that time, in connection with this area and low area No. V, then forming in the Southwest, brisk north to east winds prevailed in the Upper Lake region, with maximum velocity of NE. 27 miles at Escanaba. During the 15th the area extended itself gradually eastward over the Lake region, while low area No. V moved slowly eastward. Brisk to high east to northeast winds, with cloudy weather and rain, prevailed in the Lower Lake region. Signals hoisted in the afternoon of the 16th, were fully justified, as shown in the description of low area No. V. During the 17th, this area gradually dissipated while low area No. V disappeared. This area produced the minima temperatures of the month for the Northwest, the Upper Missouri valley, the Lake region, parts of the Mississippi valley and New England. Frosts were reported on the 16th from stations in Iowa, Wisconsin, and Michigan, in which latter state some damage was done on low grounds to vegetation, particularly in Lansing and surrounding townships.

No. IV.—This area appeared in the Northwest on the morning of the 26th in the rear of low area No. IX. Moving very slowly southeastward it was central during the 28th in Tennessee and the Ohio valley. Generally cool and partly cloudy weather, with no dangerous winds marked its passage during these dates. It remained nearly stationary until the 30th.—Cincinnati barometer fluctuating from 0.15 to 0.30 above the normal. On the morning of the 31st it had disappeared.

Areas of Low Barometer.—Eleven areas have been sufficiently marked to merit description, but the centres of only six have followed tracks well enough defined to enable them to be properly located from reports yet received. The tracks of these six are shown on Map No. I.

No. I was a continuation of area No. IX, described in the *July Review*. Its course during August was too far north of the Signal Corps stations to allow accurate charting. On the morning of the 1st it was central in southeastern Dakota, and by afternoon it had probably moved into Manitoba, its progress being marked by little precipitation and brisk SW. winds on Lake Michigan, a maximum velocity being reported from Milwaukee of SW. 26 miles at that time. During the 2nd it apparently moved eastward through the country north of the Lakes, during which day light rainfalls and fresh to brisk SW. and W. winds were reported from the Lake region. On the morning of the 3rd it probably passed over the Gulf of St. Lawrence to the north of the Canadian maritime stations. The lowest abnormal pressure, at a regular report, during its passage was—0.32 at Father Point, midnight of the 2nd. No signals were displayed in connection with the passage of this area.

No. II.—On the afternoon of the 3rd a barometric fall was reported from the Rocky Mountains eastward over the whole country, except a slight rise in Illinois, the Lower Lake region and St. Lawrence valley, the depression being most rapid in Kansas and Nebraska. At that time cloudy weather, with rainfall, was reported from all districts east of the Rocky Mountains, except the Northwest and Tennessee and Ohio valley, and fresh to brisk N. to W. winds prevailed in the Lower Lake region, with a maximum velocity of N. 29 miles reported from Sandusky. Brisk westerly winds also were reported from the Middle and South Atlantic States, with a maximum velocity of S. 33 miles at Barnegat. At midnight the pressure was reported as decreasing from the Northwest and Upper Lake region to the Western Gulf States. Brisk westerly winds, with cloudy weather, prevailed in the Lower Lake region, with a maximum velocity of SW. 26 miles at Sandusky, and partly cloudy weather with brisk NW. winds, were reported from the South Atlantic coast, with a maximum velocity of SW. 27 miles at Kittyhawk. The barometer continuing to fall in the Lower Missouri valley on the morning of the 4th, a well-defined depression was central in southeastern Nebraska; Omaha barometer 0.18 abnormally low. At this time the barometric fall was general east of the Rocky Mountains, except in New England, and cloudy weather, with rain, prevailed over the Lower Lake region, where the pressure had not fully recovered from the effects of low area No. I. During the 4th the pressure fell generally over the Lake region, the Mississippi valley and the Atlantic States, leaving no well-marked centre at midnight, at which time partly cloudy weather and gentle to fresh westerly winds prevailed in the Lake region, with a maximum velocity of NW. 30 miles at Escanaba, and cloudy weather, with rain, and fresh to brisk westerly winds, in the Middle Atlantic and South Atlantic States, with maxima velocities of N. 36 miles at Sandy Hook and SW. 34 miles at Cape May. On the morning of the 5th the pressure was below the normal over the whole country, except on the Gulf and South Atlantic coasts, being lowest—and still falling—over the Lake region and New England, where partly cloudy weather and fresh S. to W. winds prevailed. During this time a very low

pressure probably prevailed north of Ontario. On the morning of the 6th the reports showed for the preceding 24 hours a generally-decreasing pressure, from the Northwest to the Atlantic Ocean, accompanied by generally cloudy weather, and rain-fall in all districts, except that of the Upper Lakes. The pressure was then least in the St. Lawrence valley—Father Point barometer 0.42 inch abnormally low—where clear weather and gentle to fresh W. and SW. winds prevailed. From the afternoon of the 6th to the morning of the 7th the depression was central over the Gulf of St. Lawrence—the Sydney barometer at the last report 0.69 below the normal—while partly cloudy weather and fresh to brisk NW. winds were reported from New England and the St. Lawrence valley, none dangerous. No Signals were displayed during the passage of this area.

No. III.—This area formed from the remains of low area No. II. It was apparently central north of Lake Superior the afternoon of the 6th—Marquette barometer 0.18 abnormally low—at which report fresh to brisk southerly winds prevailed in the Upper Lake region, with partly cloudy weather. At midnight of the 6th central over the northern portion of Lake Michigan—Escanaba barometer 0.18 below the normal—it reached, with increasing depression, Lake Huron the morning of the 7th—Alpena barometer 0.23 abnormally low. Meanwhile partly cloudy weather in the Lower Lake region and rain from Ohio to New Jersey were reported. Moving southeast it was central over the western end of Lake Ontario the afternoon of the 7th, whence changing its course to the northeast—with pressure still decreasing—it reached eastern Ontario at midnight—Kingston barometer 0.32 below the normal. At that time the abnormal isobar of—0.20 embraced within its limits the Middle Atlantic States and Lower Lake region, over which districts cloudy weather and rain prevailed. In the afternoon a maximum velocity of NW. 28 miles was reported from Grand Haven. At midnight brisk NW. to SW. winds prevailed in the Lower Lake region, with maxima velocities of N. 28 miles at Port Huron and Sandusky, and brisk southerly winds on the New Jersey and North Carolina coasts, with maximum velocity of SW. 32 miles at Cape Lookout. The morning report of the 8th showed a long barometric trough extending from Maryland to Canada, central in Quebec. Cloudy weather was reported in the Middle Atlantic States and New England. Brisk northwest winds prevailed in the Lake region—maxima velocities NW. 28 miles at Port Huron and N. 28 miles at Sandusky, while brisk westerly winds, with maximum velocity of SW. 32 miles at Cape Lookout, were reported from the Atlantic coast. On the afternoon of the 8th it was central in the Lower St. Lawrence valley—Quebec barometer 0.26 below the normal—with brisk northwest winds prevailing from Michigan to New Jersey, and brisk southwest winds on the North Carolina coast. Maxima velocities of NW. 28 miles at Alpena and S. 28 miles at Cape Lookout were reported. Moving slowly northeast its position at midnight was but slightly changed. Cloudy weather, with rain and brisk variable winds, continued on the North Carolina coast, where a subsidiary depression apparently existed. Variable winds of maxima velocities of 25 and 26 miles, were reported from that coast. The morning report of the 9th showed that the centre had passed northeastward beyond the Canadian maritime stations. No signals were displayed during the passage of this area.

No IV.—The morning reports of the 10th, showed that the pressure had generally decreased from the Northwest to the Gulf of Mexico. Partly cloudy weather, with southerly winds, prevailed in the Upper Mississippi and Lower Missouri valleys, and rain was reported from Manitoba and Michigan. On the afternoon of the 10th, a slight depression was central in the valley of the Red River of the North. The midnight reports showed the pressure decreasing in the Lower Missouri and Upper Mississippi valleys, where fresh southerly winds and generally clear weather prevailed, while from the Lake region, slight precipitation was reported. The depression was then central in western Minnesota—Breckenridge barometer 0.14 abnormally low. Moving southeast very slowly and with little energy, it was central in northeastern Iowa at midnight of the 11th—La Crosse barometer 0.20 below the normal. Its progress during the 11th, was marked by fresh to brisk southerly winds, cloudy weather and light rain in the Upper Lake region and Upper Mississippi valley, with generally clear weather prevailing from the Lower Lake region to New England. Changing its course at midnight of the 11th to the northeast, and passing with increased pressure the morning of the 12th through Wisconsin, it was central that afternoon over the eastern part of Lake Superior. At that time, cloudy weather and rain prevailed over the Upper Lake region, and brisk southerly winds on Lakes Michigan and Huron, with a maximum velocity of SW. 25 miles at Milwaukee. At midnight the center had passed northeast into Canada. Cloudy weather then prevailed over the Lake region—with heavy rainfall in upper part—with brisk S. to W. winds, a maximum velocity of W. 48 miles being reported from Milwaukee. The course of the depression during the 13th was through Canada too far north to allow its centre to be accurately located by reports yet received. During the 13th it caused in the Lower Lake region cloudy weather and rain, with brisk S. and SW. winds, maxima velocities of SW. 27 and 28 miles being reported from Oswego at afternoon and midnight, respectively. At the morning report of the 14th the centre, with decreased pressure, was in the Lower St. Lawrence valley—Quebec and Father Point barometers 0.46 below normal. Brisk southerly winds with cloudy weather then prevailed in New England, and cloudy and rainy weather, with westerly winds, in the St. Lawrence valley. On the afternoon of the 14th it had passed over the Gulf of St. Lawrence, cloudy weather and occasional rain, with brisk westerly winds being reported from New Jersey to the Gulf of St. Lawrence, with a maximum velocity of W. 25 miles at Boston.

No. V.—The barometer fell steadily from Kansas to Texas from midnight of the 13th to midnight of the 14th, at which latter time a depression existed central in Indian Territory—Denison barometer 0.15

below the normal. Moving east to central Arkansas the morning of the 15th, and thence north-eastward, its centre was in the Tennessee valley the afternoon of the 15th, at which time cloudy weather and rain prevailed in the Atlantic States, Lower Lake region, Tennessee and Ohio valley. Brisk to high northeast winds were reported in the Lower Lake region, and brisk southeast on the Atlantic coast, with maxima velocities of E. 25 miles at Kittyhawk and NE. 40 at Sandusky. Cautionary Signals were ordered from Smithville north along the Atlantic coast to include New York, and also for all stations on Lakes Huron, Erie and Ontario. The course of the center changing to the north, at midnight of the 15th was in the Ohio valley—Louisville barometer 0.21, abnormally low. At that time the Lower Lake reports showed brisk to high northeast winds—Sandusky maximum velocity NE. 27 miles—with cloudy weather and rain, while on the New Jersey and North Carolina coasts brisk east and southeast winds, cloudy weather and rain, prevailed. Moving northeastward the depression on the morning of the 16th was central in western Pennsylvania, with slightly decreased pressure—Pittsburgh barometer 0.24 below the normal. Cloudy weather and rain generally prevailed, with brisk to high winds, northeast in Lower Lake region, easterly in New England and on Middle Atlantic coast, and southerly on North Carolina coast, with maxima velocities reported at Cape Hatteras SW. 26, Sandy Hook SE. 36, Toledo NE. 26 and Sandusky NE. 59 miles. Cautionary Signals were continued on the South and Middle Atlantic coasts, and were ordered for all New England stations. The position and conditions of this depression had changed but slightly at midnight. Cloudy weather and rain prevailed in the Lower Lake region and Atlantic States, with brisk southerly winds on the New Jersey and North Carolina coasts—maxima velocities S. 25 at Cape May, S. 28 at Cape Lookout, NE. 28 at Toledo and 26 miles at Sandusky. The signals for Lake Huron and at Toledo were then lowered, having been justified by reported velocities of 25 and 26 miles, except at Alpena. At midnight, the center being in New York, brisk southerly winds, with maxima velocities of S. 26 at Cape May and S. 28 miles at Kittyhawk were reported, with partly cloudy weather for the Middle and South Atlantic coasts, while fresh northeast winds and rainy weather generally prevailed in the Lower Lake region. On the morning of the 17th the depression, nearly stationary and central in New York, was evidently filling up, and Signals from Eastport southward along the coast, to include New York, were lowered. On the afternoon of the 17th Signals along the coast from Sandy Hook to Kittyhawk were lowered, leaving Signals displayed at Smithville, Wilmington, Macon, Cape Lookout and Cape Hatteras in advance of low area No. VII.

No. VI.—This area appeared on the Southern Pacific coast on the 15th, and moving slowly northward attained its minimum of pressure at Portland, Oregon, midnight of the 18th—barometer 0.35 below the normal. Its course cannot be accurately charted; its passage was attended by partly cloudy weather and no precipitation. The pressure increased somewhat during the 19th. At midnight of the 19th and morning of the 20th, rain was reported from Olympia, which extending southward reached Roseburg by the morning of 21st. Reports at that time showed that during the past 24 hours the barometer had fallen, ranging from 0.20 at Roseburg to 0.26 at Olympia, the latter being 0.44 below the normal. Light rain fell during the 21st from Olympia southward to San Francisco, and also in western parts of Nevada and Idaho, while the pressure steadily increased on the Pacific coast, and the center moving eastward into the Plateaux districts, was filled up during the 22d.

No. VII.—A few reports already received from the West Indies, Bahamas and vessels at sea seem to indicate the existence of this storm for some days previous to its appearance on the Atlantic coast, but are not sufficient to justify the charting of its center, as yet, further southeast than shown on chart. The paucity of reports may be, in part, attributed to the small area of the storm. The barometer fell slowly at the Florida stations during the 16th until midnight, when the pressure became stationary. Partly cloudy weather and variable winds prevailed until midnight, when a calm was reported from Havana, fresh northwest winds from Key West, and brisk north from Punta Rassa. On the morning of the 17th an abnormal barometric fall of 0.07 was reported from Jacksonville, Punta Rassa and St. Marks. The wind at St. Marks remained southwest, but at Jacksonville changed to brisk north. Clear or partly cloudy weather prevailed along the coast from South Carolina to Cuba. The afternoon (17th) report showed a stationary barometer in the South Atlantic States and Florida, except a sharp fall at the coast stations from Smithville to Jacksonville; the latter barometer 0.28 below the normal. Clear, calm weather prevailed at Havana; fresh west winds and partly cloudy weather at Key West and Punta Rassa; fresh northwest winds and partly cloudy weather, with a light rain-fall, at St. Marks; gentle northeast and east winds, partly cloudy weather, from Charleston to Jacksonville, with moderate rain-fall at Charleston and Savannah. A very heavy local rain of 1.45 inches, with a northeast wind, was reported from 2:23 to 5:30 p. m. at Gulf Hammock, western coast of Florida. The depression was then probably central some 200 miles east of the central Florida coast. The Cautionary Signals displayed in connection with area No. V were ordered down except from Cape Hatteras south to include Smithville, which remained displayed for this depression. During the day at Cape Lookout "a tremendous southeast sea-swell broke on the beach all day, with an unusually high tide in the afternoon." At Savannah heavy rain fell from 11:25 a. m. to 6 p. m., with southeasterly wind backing to northwest during the afternoon. At 7:50 p. m. the gale commenced at Cape Lookout with a heavy southeast rain-squall, which lasted until 10:05 p. m. At 10 p. m. the gale commenced at Macon. The schooner "Abbie J. Bentley," which passed Hatteras at 8 p. m., going north, experienced fresh breezes at midnight, which obliged light sails to be furled. At midnight of the 17th, the reports showed a stationary or rising barometer over the whole country east of the Mississippi river, except in Georgia, South Carolina and the southern

part of North Carolina, with the greatest abnormal fall of 0.17 at Charleston, (barometer 0.35 below the normal.) Brisk to high southeast winds and cloudy weather prevailed from Cape Hatteras to Cape Lookout, brisk east and northeast winds from Smithville to Charleston, with heavy rain and a brisk northwest wind at Savannah. Clear weather, with gentle northeast winds, prevailed over Florida and the interior of Georgia. High winds were reported on the Carolina coast ranging from NE. 25 at Charleston to SE. 32 miles at Cape Lookout. The storm-centre was then off the South Carolina coast. Cautionary Signals were then ordered at Cape Henry and Kittyhawk. The gale after midnight increased at Smithville, the wind backing to northeast, with heavy rain and rapidly falling barometer. Between 3 and 4 a. m., (18th,) the wind backed to northwest with increasing force, and at the same time (3:15 a. m.), the gale commenced at Wilmington. At 4 a. m. at Cape Henry the wind, which had been southwest, died away to a calm, and rain commenced, followed immediately by light north and northeast winds. At 5 a. m. the wind reached its greatest velocity, 37 miles NW. at Smithville, and at 5 a. m. at Wilmington W. 68 miles. At that time (5 a. m., 18th, at Cape Lookout, the wind had increased to SE. 80 miles, the rain fell in torrents and a fearful sea swept away the stable and outbuildings. Schooner "Seychelle" came ashore as wind veered to southwest, and although drawing twelve feet was carried, a total wreck, above the highest tide mark, over ground never remembered to have been overflowed before. After 5 a. m. the wind and rain abated at Smithville, with 2.10 inches rainfall in preceding ten hours. At 6:30 a. m. (18th) at Macon, the anemometer registered 80 miles and then the electrical connections failed. At 6:30 a. m. the barometer at Cape Lookout, which, at 6 a. m., was 29.22 had fallen to 29.15, and the anemometer cups were blown away, the wind then blowing at the rate of 138 miles per hour. The barometer remained at 29.15 till 7 a. m., the wind and sea still increasing. By 7:30 a. m. the barometer had risen to 29.18 with wind at its greatest force—an estimated velocity of SW. 165 miles. At Portsmouth, N. C., the wind at 6:30 a. m. had attained a velocity of SE. 49 miles. The 7.35 a. m. reports showed the cyclone central inland of the North Carolina coast stations, lowest pressure, Cape Lookout, 29.24,—0.75 below the normal and a gradient of 0.30 between that station and Cape Hatteras. Signals were ordered from Norfolk north along the coast to include Boston. Heavy rains had set in about 2 a. m. at Cape May, at which station the barometer at this report was 0.18 below the normal. At 8.45 a. m. the wind at Portsmouth, N. C. was SE. 97 miles when the recording apparatus became temporarily disabled. At Macon the wind veered to SW. at 8 a. m. 18th and the tide rose four feet above the ordinary high tide. At 8:30 a. m. the wind reached its maximum recorded velocity at Cape Hatteras, SE. 74, when the cups were blown away, and at Kittyhawk at 9:50 a. m., SE. 100 miles. The gale continued at Wilmington until 10 a. m., with a total rain-fall of 4.60 in 6½ hours. At Norfolk, at 10:45 a. m., the barometer had fallen in preceding hour from 29.58 with NE. 24 miles to 29.16 NE. 48. At 10 a. m. (18th) schooner "A. J. Bentley," latitude 37° 26' N., 74° 2' W., which had been compelled at 8 a. m., to close-reef sails, experienced brisk, southeast winds, which increased rapidly in force, at 11 a. m. blowing a southeast hurricane, which carried away jib and obliged her to take in nearly all sail. At noon the wind was hardest ever experienced, rain very heavy and waves estimated at 40 feet from trough to crest. At 2:20 p. m., (barometer compared with Signal Service at New London and found to be an excellent instrument) read 29.20. Hurricane increased to 3 p. m., when it carried away main-sail and obliged her to scud under bare poles. Wind blew violently until 4:30 p. m., when it settled down to severe gale, little north of west, until 8 p. m. At 11 a. m., the wind at Cape Henry had reached a velocity of N. 66 miles, when it moderated for a short time to 35 miles, and shifted to northwest, blowing with hurricane violence 70 miles at 11:30 a. m. At 11:15 a. m. (probably the time the wind lulled at Cape Henry) the Norfolk barometer reached 29.12, lowest point, and the wind fell to NE. 39. The barometer had risen at 11:30 a. m. and 11:45 a. m. to 29.13 (NE. 34) and 29.20 at which latter time the wind changed to north and attained its maximum velocity, 72 miles. During this half hour the greatest part of the damage, at Norfolk and its vicinity, was done. At 12:30 p. m. the rising mercury reached 29.42 while the wind backed to NW. 60. At the same hour (12:30 p. m., 18th) at Cape Henry the wind had reached a velocity of NW. 76 when the anemometer cups were carried away. The wind increased steadily, and about 2 p. m. attained its greatest velocity—estimated at NW. 100. At Johnsonstown, eastern shore, Virginia, about 35 miles north of Cape Henry, the barometer was at its minimum between 12:30 and 1:30 p. m. The wind on that day (18th) was heavy NE. until noon and then "shifted" to NW. with heavy gusts. Thirty panes of glass were blown from the observer's house *outward against* the wind's direction. The bark "Eliza J. McManeny" at noon (18th) 45 miles southeast of Five Fathom Bank lightship, reported barometer, early in the day, falling very rapidly, with SE. wind and rain in torrents. At 2 p. m. the wind ceased blowing from the SE. leaving a terrific sea, and suddenly the wind came out of the NW. and blew "a perfect cyclone" for two hours. At Atlantic City the maximum recorded velocity NE. 60 miles was at 3 p. m., after which time the flooded battery failed to record, and at Barnegat N. 64 miles about 5 p. m., at which time 5.39 inches rain-fall had fallen in nine hours. The U. S. S. Wachusett reports that 4 a. m. (18th) off Virginia Capes, barometer stood 30.04. SSE. wind, force 2, and squally weather and moderate swell; 8 a. m. barometer 30.03, 10 a. m. 30.01 weather unchanged. At noon position 38° 45' N. 73° 51' W., wind E. force 6, ship heading NNE. At 2 p. m. headed E. by N., barometer 29.71, E. wind, force 9, sails furled. At 4 p. m. barometer 29.46, wind SE., force 10. At the afternoon report of the 18th, (4:35 p. m.) the pressure was central about one hundred miles east of Barnegat. At that time Cautionary Signals were ordered up at Portland and Eastport. The signals displayed at Baltimore and on the North Carolina coast, from Smithville to Cape Lookout inclusive, and at Kittyhawk, were lowered. From Lewes northward along the Atlantic coast, to include New York, the Cautionary

Signals were changed to Off-shore. At 4 p. m. the wind, which had been increasing steadily at Cape May during the day, attained a velocity of N. 60 miles and shortly after the wind backed to west, and the rain—which had commenced at 2 a. m. (18th) ceased—total amount 8.46 inches. At this report, New England, where heavy rains, east and northeast winds had prevailed for preceding day in connection with the remains of low area No. V, felt the influence of the advancing depression as far north as to include the greater part of Massachusetts. The storm commenced at New Haven about noon, soon increasing to a severe northeast gale which soon backed to N, and at 9:20 p. m. blew 33 miles. Rain-fall in 15 hours 4:15 inches. At New London a sharp barometric fall since noon was shown by the 2 p. m. report, when a heavy rain-storm set in with heavy gusts from the N. and NW.—the heaviest from the N.—attaining a velocity of 37 miles about midnight. At Sandy Hook the minimum barometer and highest wind occurred at 9 p. m. (18th) 29.59, NW. 52 miles. At New York City, however, the maximum velocity was but NE., 24 miles during p. m. 18th. At 5:30 p. m. the U. S. S. Wachusett, about 39° N., 73° 30' W., reported the barometer fallen to 29.15—a fall of 0.86 inch in seven and one-half hours—wind SE. by E., force 11. Then fell a calm with confused, heavy seas. At 5:45 p. m. light airs from NNW., and then a hurricane from NW., until 10 p. m. At 6 p. m. barometer 29.32 (a rise of 0.17 in 30 minutes,) NW. wind, force 11. At 8 p. m. barometer 29.52, wind-force 12. At midnight wind moderated, W. by N., force 7, barometer 30.08, a rise of 0.93 inch in six and one-half hours. The U. S. S. Constellation left Newport 2 p. m., August 18th, barometer at noon 30.02, slowly falling to 29.96 at 3 p. m. Rounded Point Judith, 4 p. m. barometer 29.90 and at 5 p. m. 29.80 with very heavy rain and NE. squalls; shortened sail. Shortened sail still further between 6 and 7 p. m., wind increasing, barometer 6 p. m. 29.75, 7 p. m. 29.63. Could not see Red Flash Race Light although less than a mile distant. Wind increased to whole gale, backing slowly, and barometer fell rapidly—at 8 p. m. 29.43 and 9 p. m. 29.32. Between 8 p. m. and midnight obliged to take in all but storm sails, send down yards and bend sheet cables. 9 p. m. barometer 29.30 and 10 p. m. 29.25, 10.15 p. m. 29.23 (lowest point,) 11 p. m. 29.27, midnight 29.35, (rain ceased) 1 p. m. (19th) 29.48, 1:30 p. m. 29.50, at which time wind moderated very much, 2:30 a. m. 29.61. At 10 p. m. the Bark Glint, 20 miles SSW. of Fire Island, had a hurricane from ESE. to NNW., lasting an hour-and-a-half. At the midnight report 18th the storm was central just east of Long Island. The signals then displayed from New Haven, at all coast stations east and north to include Portland, were then changed to Off-Shore Signals. At 11 p. m. the steamer John Hopkins about 25 miles off Chincoteague had heavy southeast winds with tremendous seas; the wind changed suddenly to northwest and the rain fell in torrents. The storm commenced from New Bedford, Mass., to Portsmouth, N. H. at about 8 p. m. At that time the barometer at New Bedford stood at 29.48 with a strong E. by S. wind, which increased to a gale by 10:30 p. m. At midnight a calm, probably at the center of the depression; at 12:20 a. m. 19th, the barometer had reached its minimum 29.05. The wind then recommenced with great violence (direction not given but probably NW.) and attained its maximum force between 2 and 3 a. m. At 5 a. m. (19th) the barometer had risen to 29.62, and a strong W. by S. wind prevailed. At Newport the storm commenced about 8:30 p. m.; the wind attained by 11 p. m. a velocity of 26 miles N. E. At 11:23 p. m. (18th) the center was probably very near the station, the barometer standing at 29.11—a fall of 0.72 in. in the preceding 6 hours and 25 minutes—and the wind lulled to six miles per hour. At midnight the wind shifted to violent northwest, attaining a velocity of 44 miles at 2 a. m., and the barometer rose with a rapidity equal to its fall, showing 8½ hours later a rise of 0.71 inch. At Wood's Holl the storm which began at 8:15 p. m., reached its height at 2:30 a. m. 19th, when the wind blew at the rate of 56 miles from the northwest. The midnight report showed a barometric fall of 0.78 in. in 6½ hours. At Boston the gale which had commenced at about 6 p. m. was extremely severe; the wind attained its highest velocity NE. 44, at 11:30 p. m. At Thatcher's Island, commencing at 8 p. m., the storm was at its height at 3:40 a. m. (19th), the wind blowing 54 miles NE. The barometric fall at midnight report of 18th was 0.42 inches in preceding 6½ hours. At Highland Light, Cape Cod, the gale continued from 5 p. m. 18th, until 10 a. m. 19th, being the severest for years. The wind attained a velocity of 40 miles. At Newburyport, Mass., the storm commenced about 8 p. m. and from 9 to 12 p. m. (18th) a veritable hurricane was reported to have prevailed. The barometer at 10 p. m. (local time) was 29.62 showing a fall of 0.43 inch in preceding 7 hours. The barometer must have been much lower during the night as at 6 a. m. (19th) it stood at 29.55. At Portsmouth, N. H., commencing at 8 p. m., 18th, the gale lasted only until 3 a. m., 19th, the wind attaining its maximum velocity NE. 50 miles, at midnight. The 7.35 a. m. report of the 19th showed the cyclone central a short distance south of Eastport, at which station heavy rain, barometer 29.30—0.70 below the normal, and wind E. 54 miles were reported, while at the remaining New England and the Middle Atlantic stations brisk to high NW. winds and clear or clearing weather prevailed. Signals were ordered down from New York eastward and northward to include Boston, and also at Cape Hatteras. The Signal at Eastport was changed to Off-shore. At Portland, Me., a heavy rain had commenced and a northwest gale sprung up early in the morning. At 7 a. m. (local time) the barometer stood at 29.53, a fall of 0.48 inch, in 17 hours, with a NW. wind of 20 miles, and a rain-fall of 2.03 inch in 15 hours. At 8 a. m. (morning report of 19th) the barometer had risen to 29.55 with wind NW. 24 miles. The maximum wind velocity NW. 42 miles occurred at 4 a. m. 19th. At Eastport the barometer continued to fall, standing at 10.30 a. m. (19th), 29.20 NE. 34 miles; at 11 and 11.15 a. m. 29.16 (lowest) NE. 34 and 32 miles; 12 m. 29.19 N. 21; 1 p. m. 29.29 NW. 34; 2 p. m. 29.37 NW. 26; 3 p. m. 29.45 NW. 27; at 5.15 p. m. (afternoon observation) 29.56 NW. 36. Heavy rain prevailed until 12.30 p. m. and then light rain until 4.30 p. m. The barometer at 11.15 a. m. had fallen 0.95 inch in 27 hours. At the afternoon report 19th, the storm had passed into New Brunswick—

Halifax barometer 0.42 below the normal. Signals were lowered from Lewes northward to include all displayed, except at Eastport, which were lowered at midnight. By midnight of the 19th the storm was probably central over St. Lawrence bay, moving northeast.

This storm is especially interesting on account of the rapid and extreme fluctuations of pressure and the attending phenomena near the immediate center. The following tabulated statement shows the most marked phenomena attendant on its passage as compiled from reports now at hand :

PLACE.	BAROMETER.					WIND.				Time of occur- rence of cen- tral calm- 18th.	TOTAL RAIN-FALL.
	Lowest reading.	Fall.		Rise.		In Front of Storm.		In Rear of Storm.			
		in.	h. m.	in.	h. m.	direction.	max. vel.	direction.	max. vel.		
Macon.....	—	—	—	—	—	SE.	*100	—	—	—	—
Lookout.....	29.17	0.73	8.00	0.72	7.00	SE.	*138	SW.	*165	—	4.29
Norfolk.....	29.12	0.56	4.15	0.75	5.15	NE.	48	NW.	60	—	6.03
Cape Henry.....	29.05	0.68	4.30	0.80	4.30	N.	65	NW.	100	11:10 a. m.	4.62
Cape May.....	29.51	0.41	6.30	0.40	9.00	N.	64	NW.	60	—	8.46
Schr. H. A. Bentley, 38° N. 74° W.....	29.20	—	—	—	—	SE.	*90	—	—	3 p. m.	Very heavy.
U. S. S. Wachusett, 39° N. 74° W.....	29.15	0.85	5.30	0.93	6.30	SE. by E.	†75	NNW.	†90	5:45 p. m.	—
U. S. S. Constellation	29.33	0.79	10.15	0.38	4.15	—	†65	—	—	—	Torrents.
Newport.....	29.11	0.72	6.25	0.71	8.30	N.	26	NW.	44	11:23 p. m.	1.96
New Bedford.....	29.05	0.84	10.20	0.57	4.40	E. by S.	*50	NW.	*50	Midnight.	1.74
Wood's Holl.....	29.08	0.78	6.30	0.70	8.38	ESE.	40	NW.	56	—	2.40
Eastport.....	29.16	0.95	27.00	0.67	12.30	E.	56	N.	38	—	3.34

* Estimated. † Converted from a scale of 0 to 12.

The amount of damage done by this storm, can not be enumerated in detail within the limits of this Review. The injury to inland property over sections traversed by the immediate center was very extensive. Fortunately this damage was confined to the track of the storm-center itself, and consequently, is quite limited. The damage to maritime property must have been enormous, reports already at hand, show that over one hundred large vessels were shipwrecked or suffered serious injury, while the number of yachts and smaller vessels which were destroyed or seriously damaged, must certainly exceed two hundred.

No. VIII.—During the 20th the barometer fell steadily in the Northwest, and at midnight a depression was central in western Dakota, at which time Bismarck reported barometer 0.19, abnormally low, and a heavy local rain-fall. On the morning of the 21st the area was central, with decreased pressure, in eastern Dakota—Breckenridge barometer 0.35 below the normal. Cloudy weather and occasional rain, with fresh to brisk southerly winds, then prevailed over the Upper Lake region. By that afternoon it had moved southeast into Minnesota, with no change of pressure, when partly cloudy weather, occasional rains and brisk southerly winds were reported from the Upper Lake region, with maxima velocities of SW. 26 miles at Milwaukee and S. 25 at Grand Haven. Moving slowly east through Wisconsin the night of the 21st it was central, with decreased pressure, over Lake Michigan the morning of the 22nd—Escanaba barometer 0.42 below the normal. At that time rain and partly cloudy weather were reported from the Upper Lake region, clear or partly cloudy weather from the Lower Lake region, cloudy weather and rain from New England and St. Lawrence valley, and brisk southwest winds from Wisconsin to New England—maximum velocity S. W. 28 miles at Milwaukee. The area was central that afternoon over Lake Huron; brisk southerly winds still continuing from the Lower Lake region to New England, with maxima velocities of S. W. 28 miles at Sandusky, 27 at Cleveland and 34 at Milwaukee; there was but little precipitation reported save in St. Lawrence valley. Moving northeast the center reached the St. Lawrence valley at midnight—Montreal barometer 0.54 below the normal. Generally clear weather prevailed from the Lower Lake region to New England, with brisk S. W. winds in the Middle Atlantic States and New England, and maxima velocities reported of S. 27 miles at Cape May and W. 32 at Port Huron. The center moving northeastward, the morning of the 23rd was in the lower St. Lawrence valley with decreased pressure—Father Point barometer being 0.63 below the normal. Brisk southwest winds prevailed from Middle Atlantic States to New Brunswick, with partly cloudy weather. By afternoon the center was over the Gulf of St. Lawrence. No signals were displayed during the passage of this area.

No. IX.—During the 20th and 21st a low pressure prevailed over the Gulf of Mexico, and on these days brisk easterly winds, cloudy weather and occasional rain, were reported along the Gulf Coasts. At midnight of the 21st Cautionary Signals were ordered at Mobile, Port Eads, New Orleans and Galveston. On the morning of the 22nd the abnormal isobar of —0.20 inch included Louisiana and the greater part of Texas—Galveston barometer 0.31 below the normal. Brisk east to north winds prevailed from St. Marks to Galveston along the Gulf coast, with cloudy weather and occasional rain. Cautionary Signals were then ordered for Indianola. During the day the barometer fell rapidly over the whole Gulf region, and at the afternoon report cloudy weather and rain generally prevailed, with brisk south-east winds from Key West to New Orleans, and brisk northwest winds on the Texas coast, with maxima velocities of NW. 27 miles at Indianola, NW. 38 at Galveston and SW. 36 at New Orleans. The depression was then central in the northwest part of the Gulf of Mexico—Galveston barometer 0.48 below the normal. Very-heavy rainfalls of 1.55 at New Orleans and 2.27 inches at Mobile in past 8 hours

were reported. The barometer continued to fall at Galveston until 7 p. m. of the 22nd then reading 29.34 or 0.55 abnormally low. At midnight of the 22d the course of the depression having changed from northwest to north, it was central in eastern Texas, northeast of Galveston, at which station the barometer was 0.48 below the normal. Cloudy weather and rain prevailed in the Gulf States, with brisk easterly winds, except in southern Texas, where northerly winds, with maxima velocities of N. 28 miles at Indianola and W. 36 at Galveston were reported. Moving slowly north with decreasing pressure the area was yet central in eastern Texas the morning of the 23rd—Shreveport barometer 0.73 below the normal. Cloudy weather, with rain and brisk southeast winds, were reported from the East Gulf States, with a maximum velocity of SE. 30 miles at Mobile; partly cloudy weather, with north to west winds, in Texas, and cloudy, rainy weather, with heavy rain-falls, in Tennessee. Signals were then lowered at Galveston and Indianola, having been justified by velocities of NW. 28 miles at Indianola, and NW. 38 at Galveston. By afternoon of the 23rd the center, moving slowly with increasing pressure, had reached southern Arkansas—Shreveport barometer 0.60 abnormally low. Cloudy weather, with southerly winds, generally prevailed east of the Mississippi river and south of the Lake region. Cautionary Signals were then lowered at Port Eads, New Orleans and Mobile, having been fully justified by velocities of SE. 30 miles at Mobile and SE. 40 at New Orleans. Moving slowly NNE. the depression at midnight was in central Arkansas, with existing conditions slightly changed, except in the Lower Lake region, where the winds changed from SW. to NE. On the morning of the 24th the center was in northeastern Arkansas—Cairo barometer 0.56 below the normal. Cloudy weather, with generally light rain-fall and southerly winds, were reported from the Atlantic and Gulf States, and cloudy weather, with brisk northwest winds, in the Lower Lake region—maxima velocities NE. 25 miles at Toledo and NE. 29 at Sandusky. Cautionary Signals were ordered for all stations on the New Jersey coast and in the Lake region, except Duluth, Marquette, and Escanaba. The center, the afternoon of the 14th, reached western Kentucky. Brisk southwest winds, cloudy weather and occasional rain were reported from the Atlantic States; partly cloudy weather and brisk northeast winds from the Lake region, and northerly winds, cloudy weather and rain from the Ohio valley. At midnight the area was central in the Ohio valley—with considerably increased pressure, Cincinnati barometer 0.45 below the normal, with existing conditions but slightly changed. Maxima velocities of NE. 25 miles at Toledo and NE. 26 at Sandusky were reported. The course of the depression having changed to the east, the centre, with still increasing pressure, was in West Virginia the morning of the 25th. Brisk northeast winds, with cloudy weather and rain then prevailed in the Lower Lake region and New England and along the New Jersey coast. Maxima velocities of N. 28 miles at Toledo and N. E. 39 at Sandusky, were reported. Signals were then lowered at Lake Michigan stations, not justified. During the day the course of the depression was S. of E., and in the afternoon it was central in Virginia—Washington barometer 0.37 abnormally low. Brisk northeast winds, with cloudy weather and rain, prevailed on the New Jersey coast, and brisk to high southwest winds, with partly cloudy weather, on the North Carolina coast; cloudy weather and brisk northerly winds in the Lower Lake region. Maxima velocities from the Lake region of N. 26 miles at Milwaukee, N. 35 at Sandusky, were reported, and several instances on the Middle and South Atlantic coasts ranging from NE. 26 miles at Barnegat to SW. 36 at Cape Lookout. Cautionary Signals were ordered at New York, and from Lewes southward to include Cape Lookout. At midnight the centre was near the Virginia Capes, with existing conditions attendant on the depression substantially unchanged. The winds on the coast from Sandy Hook to Smithville, with unchanged direction, had increased in violence, except at Cape Henry, which was near the center. Actual velocities along the coast ranged from 23 miles at Kittyhawk to 36 at Cape Lookout and the maxima velocities were generally somewhat higher. Maxima velocities of N. 26 miles at Toledo and N. 29 at Sandusky, were reported from Lake Erie. All Signals remaining in the Lake region were then lowered, having been justified at all stations, except at Buffalo and Port Huron, the wind at the latter place, however, attaining a velocity of 24 miles. On the morning of the 26th, the central depression had passed eastward over the Atlantic ocean. Cloudy or rainy weather, however, generally prevailed on the Atlantic coast, with brisk to high winds, NE. from Boston to Cape May, and from NW. to SW. on the North Carolina coast. All stations on the New Jersey coast reported maxima velocities ranging from 28 to 36 miles; Cape Hatteras SW. 30 and Cape Lookout W. 36. Cautionary Signals were ordered from New Haven eastward and northward to include Boston. During the afternoon the pressure increased rapidly from North Carolina to New England, with cloudy weather and rain. The winds changed on the North Carolina coast to northwest and decreased in violence, but on the New Jersey coast remained brisk to high—from 24 to 40 miles—and Boston reported a maximum velocity of NE. 26 miles. At midnight all signals from Boston southward along the coast, to include Norfolk, were lowered,—North Carolina reports missing. The signal at Cape Henry was not lowered until the afternoon of the 27th. All signals from Boston southward to include Norfolk and Cape Henry were fully justified by velocities ranging from NE. 26 miles at Boston to E. and NE. 40 at Lewes, Atlantic City and Barnegat. The low pressure on the North Carolina coast recovered itself slowly during the 27th and 28th, during which reports were missing from a part of the coast stations. Subsequent reports showed that brisk to high winds prevailed from the morning of the 27th to the afternoon of the 28th from Kittyhawk to Cape Lookout. The Signals at these stations were lowered on the afternoon of the 28th, having been fully justified by velocities of NE. 28 miles at Cape Lookout, NE. 30 at Cape Hatteras and NE. 36 at Kittyhawk.

No. X.—An area of low barometric pressure appeared on the Oregon and northern California coasts during the 25th, and on the morning of the 26th Olympia reported a barometer 0.25 below the normal, with light rain. During the 26th and 27th cloudy weather, with light rain-falls, prevailed in Oregon and north

ern California with an abnormal pressure of about -0.20 covering Oregon. On the 27th the barometer fell generally from Idaho to Minnesota, and at midnight the lowest pressure was at Virginia City. On the morning of the 28th the abnormal isobar of -0.20 included Utah, northern Wyoming and part of Dakota, with the lowest pressure at Salt Lake City, 0.34 below the normal. During the day occasional light rains were reported in Montana and northwestern Dakota, and at midnight the barometer was lowest, 0.42 below the normal at Bismarck, with a well-defined centre in western Dakota. During the 29th, it moved northeastward into Manitoba, its passage marked by light rain in the Northwest, and by isolated cases of brisk, variable winds on Lakes Superior and Michigan. Cautionary Signals were displayed at Marquette on the morning and at Duluth and Escanaba on the afternoon of the 28th, and were lowered the morning of the 30th, having been fully justified at Duluth by a maximum velocity of NE. 32 miles.

No. XI.—The low pressure in the Gulf, consequent on area No. IX, recovered very slowly after the passage of that area, and on the morning of the 26th was nearly normal in the Western Gulf States. On that afternoon a slight general fall occurred from Arizona to Alabama, which continuing till the afternoon of the 27th, reduced the pressure in the Gulf to about 0.20 below the normal—Punta Rassa and St. Marks 0.21 below the normal and Indianola 0.17 below the normal. The pressure remained substantially unchanged until the afternoon of the 28th, when brisk easterly winds prevailed from Indianola eastward to St. Marks, and gentle south winds with cloudy weather and rain at Punta Rassa and Key West. At midnight the pressure had risen very slightly at the Gulf stations but the winds on the Texas coast changed to brisk northeasterly, and at Indianola attained a maximum velocity of NE. 33 miles. The pressure slowly declined at the morning and afternoon reports of the 29th, but rose slightly at midnight; partly cloudy weather and brisk northeast winds generally prevailed during the day with a maximum velocity of E. 32 miles at Indianola. During the 30th brisk northeast winds with cloudy weather and occasional rain prevailed from St. Marks to Indianola, while the barometer generally and slowly fell. On the morning of the 31st the fall continued, New Orleans reporting barometer 0.21 below the normal and brisk north and east winds prevailed from St. Marks to Brownsville with rain from New Orleans to Havana. Signals were ordered for Port Eads, Mobile, New Orleans, Galveston and Indianola. The fall continued steadily during the day. At midnight the New Orleans barometer was 0.29 below the normal; winds of 31 miles N. at Indianola, 28 N. at Galveston and 24 E. at New Orleans had been reported during the day. At midnight signals were yet flying, having been fully justified, except possibly at Mobile. A special report of the wind at Port Eads covering seventy-one hours, ending 10 a. m. of the 31st, gives the mean velocity during that time as $28\frac{1}{2}$ miles per hour, attaining a maximum of 35 miles ENE. at 7 a. m. and NE. 35 at 9 a. m. of the 30th. The wind blew steadily from ENE. from 11 a. m. of the 28th till 10 a. m. of the 30th, and for the succeeding 24 hours from the NE. Such steadiness of velocity and direction had never before been known at that point.

INTERNATIONAL METEOROLOGY.

On Chart No. IV. are shown the probable tracks of storm-centres over the oceans, deduced from data received at this office up to August 5th, 1879, and in the upper right-hand corner will be found an index to the same. Below is a brief notice of the above, and also of some storms over the Southern Hemisphere:

North Atlantic Ocean.—No. I. is a continuation of the secondary depression attending area of low barometer No. II. of the *June Review*; on the 8th and 9th of June it was central to the north of Newfoundland, and on the 10th probably passed to the north-northeast inducing the S. and SW. winds and rain reported on that day in 50° N. 41° W. No. II. probably originated on this day (the 10th) in the southern quadrant of the preceding depression or about 40° N. 50° W. and is the extended track of storm No. V. given on Chart No. VII of the *July Review*. On the 11th, its centre was apparently indicated in about lat. 43° N 43° W; on and after the 12th, its track was about as previously shown, although reports since received, change the position for the 12th and 13th a little towards the south. No. III probably originated in about 45° N. 15° W. on June 10th, in the south quadrant of No. II *July Review*, although as the reports from the Azores are not yet to hand, this may be considered somewhat doubtful. No. IV was central on June 30th, about 53° N 20° W, having probably developed in the south-west quadrant of area No. VI, *July Review*; it passed over the British Isles on the 1st and 2nd of July, during which days north-westerly gales and high seas were experienced from 20° to 30° W and about 50° N. No. V is a continuation of area of Low Barometer, No. I chart, No I, described in the *July Review*; on the 4th, it passed south of Newfoundland, and on the 5th, was probably joined by No. VI from Labrador; on the 5th, the centre was probably more to the north than indicated, but high seas were reported from 30° to 50° W and between 44° and 50° N; 6th and 7th, "terrific" westerly gales and high seas were reported between 20° and 30° N and 50° to 55° W; S. S. Leipzig, on the 7th, in 50° N 16° W, and on the 8th, in 50° N 18° 30' W, reports, "7th and 8th, had very heavy gales, with rain, from south-west to west and north-west, and high rough seas." No. VII is a continuation of area of Low Barometer, No. II, (chart No. I,) of *July Review*; on the morning of the 10th, it was central near Cape Breton, and on the morning of the 11th south of Newfoundland; southerly gales and high seas were reported off the banks of Newfoundland, in advance of the center of depression, which, as it moved eastward, was followed, on the 11th, by dense fogs; at 8 p. m., S. S. Virginia, was wrecked on Sable Island; 12th and 13th, it was north-east of Newfoundland, and on the 14th and 15th, developed into a quite severe storm about 50° N 30° W; on the 16th it passed south of Ireland, and on the 17th, was dissipated over Western Europe. No. VIII is a continuation of area of Low Barometer, No. VI, (chart I) *July Review*, and was north of Newfoundland on the 25th, but after this

its track may be considered doubtful and farther north than as shown on chart. *South Pacific Ocean*.—Ship David Crockett, from New York to San Francisco, reports "passed Cape Horn May 28th, 1879, and took fearful gale from W. to SW., lasting 12 days, with fearful squalls of hail and snow and fearful high sea, and on June 9th had drifted back to Cape St. John, Staten Island; sustained considerable damage to rigging and did not get past Cape Horn the second time, until June 11th." Ship Ellen Sharp, from Melbourne at San Francisco, August 7th, reports "lost topsails, &c., in hurricane June 16th, 1879." Bark B. L., from San Francisco, put into Auckland June 11th, 1879, with pumps choked, and sailed thence for Lyttleton, N. Z., on the 14th; was wrecked at Timaru, New Zealand, June 29th, at 11 p. m., during heavy SE. gale; "the master was not able to get any observations for 3 days previous;" a tug was dispatched from Christ Church, but could not reach wreck on account of tremendous sea. Ship Frank Pendleton, from San Francisco at Deal, England August 7th; shipped heavy seas off Cape Horn during which two of her crew were drowned. *Indian Ocean*.—Ship Victoria Cross, encountered stormy weather May 21st, 1879, in lat., 43°S, 61°E; sea broke over vessel, started deck house and damaged boats. Barque Caroline, June 11th and 12th, 1879, in 30° to 31° S. and 57° to 58° E. had a terrific gale from N. to WNW., with hard squalls, heavy rain, and a high sea—barometer 29.50. At Mauritius on the 11th, it was "getting gloomy at SSE'd" and on the 12th the pressure fell to 29.98 with a westerly wind and light rain. *Bay of Bengal*.—On chart No. IV is shown the track of a slight depression which probably moved northward over northern India, from May 30th to June 6; it was accompanied by heavy rain (nearly 7.00 inches) at Cuttack on the 30th, and severe gale at Darjeeling on the 5th.

TEMPERATURE OF THE AIR.

The isothermal lines upon Chart No. II., show the general distribution of the temperature for August 1879. By reference to the table of average temperatures given on the same chart, it will be seen that there has been a general deficiency as compared, with the means for many years, in all districts east of the Rocky Mountain slope, except Florida, which shows a normal temperature, and the northern Rocky Mountain slope, which shows a slight excess. The greatest deficiencies are reported from the Gulf States, especially Texas, Tennessee and the Ohio valley and the New England States. The smallest from the Lake region, Lower Missouri valley, and Middle Eastern Rocky Mountain slope. An excess is reported from the plateau districts and the Pacific coast, except at San Diego, where it is normal.

Maxima and Minima Temperatures.—Upon charting the maxima temperatures of the month it appears that throughout the country generally, the range was from 90° to 99°. At isolated stations on the Atlantic coast from Maine to North Carolina and in the Lake region, maxima temperatures ranging from 81° to 89° were reported. The lowest maximum on the Atlantic coast was 81° at Cape Lookout, and in the Lake region 82° at Buffalo. The lowest maximum on the Pacific coast was 81° at San Diego. The line of maxima temperatures of 100° and above confines within its limits all of Texas except the coast stations, the southern half of Arizona and the interior of California. The highest reported temperature during the month from the Signal Service stations was 115° at Yuma, Arizona.

Upon charting the minima temperatures for the month it is found that, excepting at the elevated stations, but one station—Marquette, 37°—reported a minimum temperature of less than 40°. The area of from 40° to 50° included the interior portion of New England, excepting isolated southern stations, the northern portion of the Upper Mississippi valley, the Northwest and Northern Rocky Mountain Slope. The area from 60° to 70° comprises within its limits the Middle Atlantic States, Virginia, the interior of North Carolina, Tennessee and the Ohio valley, Central Mississippi valley, the Lower Missouri valley, Nebraska and Indian Territory, portions of Texas and Arizona and California. The only minima temperatures above 70°, yet reported, are 71° at Galveston and Indianola, and 72° at Tucson, Arizona.

Minima and Maxima Temperatures are respectively as follows: *Maine*: 43° at *Orono, 49° at East-port and 93° at Portland. *Vermont*: 43° at *Lunenburg, 45° and 90° at Burlington and 97° at *West Charlotte. *Massachusetts*: 46° at *Springfield Armory and 51° at Thatcher's Island, 94° at Boston and 100° at *Somerset. *Rhode Island*: 55° and 87° at Newport. *Connecticut*: 49° to 89° at New Haven and 97° at *Mystic. *New York*: 42° at *Waterburg, 48° at Rochester, 90° at New York City, and 98° at *Starkey. *Pennsylvania*: 38° at *Franklin, 50° at Pittsburgh, 93° at Philadelphia, and 97° at *Chambersburg. *Delaware*: 60° and 90° at *Dover. *Maryland*: 50° at *Woodstock, 56° and 92° at Baltimore. *District of Columbia*: 55° and 96° at Washington. *Virginia*: 45° at *Snowville, 57° and 95° at Lynchburg. *West Virginia*: 51° and 85° at Morgantown. *North Carolina*: 46° at *Highlands, 56° at Charlotte, 98° at Wilmington and Weldon. *South Carolina*: 60° at *Spartanburg, 62° and 95° at Charleston. *Georgia*: 56° at McPherson Barracks, 64° at Augusta and 97° at Savannah. *Florida*: 62° at *Ft. Barrancas, 65° and 91° at St. Marks and 102° at *Houston. *Alabama*: 59° at *Wilsonville, 67° and 94° at Mobile. *Mississippi*: 62° at *Fayette, 62° and 97° at Vicksburg. *Louisiana*: 61° and 96° at Shreveport and 98° at *Pt. Pleasant. *Texas*: 48° at Fort Davis and 105° at Pilot Point. *Ohio*: 44° at *Westerville and *Urbana, 56° and 96° at Cincinnati. *Kentucky*: 57° and 96° at Louisville. *Tennessee*: 50° at Knoxville and 96° at Nashville. *Arkansas*: 61° and 96° at Little Rock. *Michigan*: 34° at *Lansing, 37° at Marquette and 96° at *Lansing and Marquette. *Indiana*: 46° at *Wabash, 53° and 93° at Indianapolis and 95° at *Logansport. *Illinois*: 45° at *Riley, 52° and 91° at Chicago and 100° at *Louisville. *Missouri*: 47° and 100° at *Kansas City, 55° and 99° at St. Louis. *Kansas*: 49° at *Lawrence, 55° and 95° at Dodge

City and 103° at *Holton and *Wellington. *Wisconsin*: 40° at *Neillsville, 48° and 90° at La Crosse and 95° at *Manitowoc. *Iowa*: 42° at Ames and Guttenburg, 48° and 93° at Des Moines and 100° at *Boonsboro. *Nebraska*: 36° at *Sidney Barraeks, 46° at North Platte, 99° at North Platte and *Sidney Barraeks. *Indian Territory*: 56° at Ft. Sill and 104° at Ft. Gibson. *Minnesota*: 44° and 92° at Breckenridge, 96° at *Ft. Snelling. *Dakota*: 41° and 98° at Ft. Buford. *Colorado*: 23° at Pike's Peak, 32° at *Georgetown, 50° and 95° at Denver. *New Mexico*: 48° at Silver City and 104° at La Mesilla. *Wyoming*: 40° and 92° at Cheyenne. *Montana*: 40° and 97° at Ft. Keogh. *Utah*: 46° and 95° at Salt Lake City, 102° at *Kanab. *Nevada*: 45° and 96° at Pioche, 100° at Carson City. *Arizona*: 42° at Prescott, 115° at Yuma. *Idaho*: 46° and 103° at Boise City. *California*: 34° at Campo, 48° at Visalia and 108° at Visalia and Red Bluff, and 121° at *Indio. *Oregon*: 45° and 92° at Roseburg.

Those marked with * are voluntary reports.

Ranges of Temperatures at Signal Service Stations.—The monthly ranges will appear from an examination of the maxima and minima just given. The greatest daily ranges vary in New England from 15° at Wood's Holl, and 26° at Mt. Washington to 30° at Eastport and Springfield. Middle Atlantic States from 16° at Cape May to 26° at Washington. South Atlantic States 13° at Portsmouth, N. C., to 29° at Charleston. Gulf States from 15° at Galveston and New Orleans to 31° at Corsicana. Tennessee and Ohio valley from 20° at Cairo to 31° at Pittsburgh. Lower Lake region, from 21° at Buffalo to 30° at Rochester. Upper Lake region from 21° at Chicago to 34° at Marquette. Upper Mississippi valley from 23° at Davenport to 31° at Des Moines. Lower Missouri valley from 26° at Omaha to 34° at Yankton. Northwest from 39° at Bismarck to 42° at Pembina. Rocky Mountain slope from 24° at Pike's Peak and 27° at Denison and Henrietta to 44° at Santa Fe and 45° at Cheyenne. Rio Grande valley from 25° at Laredo and Rio Grande City to 36° at Brackettville. California, from 29° at San Francisco to 46° at Visalia.

Frost.—2nd Fort Buford; 5th and 15th, Lunenburg, Vt.; 8th and 16th, Cresco, Iowa; 8th, 16th and 17th, at Neillsville, Wis.; 8th, 16th and 24th, at Lansing, Mich.; 16th, cut corn and potatoes in Lansing and surrounding townships badly, and in Locke township killed corn, buckwheat, tomatoes, &c.; 9th (?) Palouse City, Washington Ty., killing vegetables, ice formed but damage not extensive." 9th, Embarrass, Wis., and Fort Stevenson, Dak.; 10th Litchfield and Catawissa, Pa.; 11th Cooperstown, N. Y.; 15th Ontonagon, Mich., "nipping tender vines;" 17th Thornville, Mich.; 29th Winnemucca, Nev., wilting potato and other vines; 30th Georgetown, Col., "water froze 100 feet above the town." Summit, Col., (elevation 11,300 feet) frost every night. 31st Virginia City, Montana.

Ice.—7th Mt. Washington, N. H., $\frac{1}{2}$ of an inch; 9th (?) Palouse City, Washington Ty., $\frac{1}{2}$ of an inch; 16th Locke township, Mich.; 30th near Georgetown, Col.

PRECIPITATION.

General Notes on Precipitation of Month.—The general distribution of rainfall for the month is illustrated as accurately as possible on chart No. III by returns from about 500 stations. In the lower left-hand corner of the chart will be found a table giving the average precipitation for August by districts. In general, the rainfall has been deficient from New England westward to the Rocky Mountains, and in California; in excess from the Middle and South Atlantic States westward to include the Lower Mississippi valley and Texas. The deficiencies were most marked in Minnesota and Missouri. The excess of precipitation has been greatest in the Eastern Gulf States, Ohio valley and the Middle Atlantic States. In the remaining districts, the departure from the normal rainfall has not been marked. None but local droughts have been reported. The deficiencies reported from Minnesota and the Missouri valley compensate for the excess of precipitation during July, while the great excess in the Ohio valley and Western Gulf States, counterbalance the marked deficiencies, which existed in those districts during the previous month.

Specially Heavy Rains.—1st, St. Marks, Fla., 6.41 in.; 2nd, Forsyth, Ga., 2.43 in. in 6 hours; Fort Barrancas, Fla., 2.73 in. in 3 hours 50 minutes; Franklin N. C., 5.90 in.; 3rd, Hudson, Mich., 2.20 in. in 8 hours; 4th, Accotink, Va., 1.40 in. in 9 hours; Morgantown, 2.31 in.; Gainesville, Ga., 3.60 in.; 5th, Keokuk, 2.11 in.; Augusta, Ill., 2.76 in.; Mt. Auburn, O., 2.33 in. in 1 hour 15 minutes; Cincinnati, 1.79 in. in 2 hours 45 minutes; 6th, Indianapolis, 2.05 in.; 7th, Woodstock, Md., 2.35 in. in 9 hours; Mt. Auburn, O., 2.27 in. in 6 hours; 9th, Portsmouth, N. C., 3.69 in.; Cape Lookout, 2.58 in. on the 8th and 9th; Point Pleasant, La., 3.02 in. in 1 hour; 10th, Gulf Hammock, Fla., 2.40 in. in 3 hours; 13th, New Orleans, 2.54 in.; Vevay, Ind., 1.90 in. in 30 minutes; Brookhaven, Miss., 4.50 in. in 13 hours; 14th, Mobile, 3.90 in.; Fort Barrancas, Fla., 6.07 in. in 3 hours and 35 minutes; 15th, Louisville, 2.86 in.; Sandusky, 2.70 in. on the 15 and 16th; Anna, Ill., 4.26 in. in 16 hours; Louisville, Ill., 14th and 15th, 2.50 in.; St. Meinrads, Ind., 4.55 in. in 24 hours and 55 minutes; 16th, Erie, 3.11 in.; Rochester, N. Y., 2.65 in.; Oswego, N. Y., 3.14 in.; Cleveland, O., 2.59 in.; 17th, Highland, N. C., 2.00 in. in 8 hours; Fort Barrancas, Fla., 2.73 in.; Lynchburg, Va., 1.04 in.; Cape Lookout, N. C., 4.29 in. on the 17th, and 18th; 18th Atlantic City, N. J., 8.97 in., 6.72 in. in 9 hours; Sandy Hook, N. J., 6.38 in.; New London, Conn., 4.16 in.; New Haven, Conn., 5.12 in.; Norfolk, Va., 6.03 in., 5.13 in. in 9 hours; Wood's Holl, Mass., 2.27 in.; Wilmington, N. C., 8.04 in., 4.38 in. in 8 hours and 35 minutes; Thatcher's Island, Mass., 4.77 in., on the 18th, and 19th; Springfield, Mass., 4.36 in. on the 18th, and 19th; Cape May, N. J., 8.46 in., 6.85 in. in 9 hours; 19th, Mt. Washington, N. H., 2.60 in.; 20th, Fayetteville N. C., 3.50 in. in 1 hour; 21st, Fayetteville, N. C., 2.25 in. in $1\frac{1}{2}$ hours; 22nd, Fort Barrancas, Fla., 3.35 in.; New Orleans, La., 2.11 in.; Mobile,

La., 2.79 in.; Northport, Mich., 3.55 in.; 23rd, St. Marks, Fla., 2.34 in.; Shreveport, La., 3.47 in.; Little Rock, Ark., 4.04 in.; Point Pleasant, La., 22nd, and 23rd, 6.73 in., of which 4.31 in. fell in 24 hours; 24th, Urbana, O., 2.07 in. in 14 hours; College Hill, O., 24th, and 25th, 2.50 in. in 22 hours; Bethel, O., 3.50 in. in less than 24 hours; Mt. Auburn, O., 24th, and 25th, 2.54 in. in 27 hours; Cincinnati, O., 2.68 in. on the 24th, and 25th; New Harmony, Ind., 3.45 in.; Cairo, Ill., 2.98 in.; Louisville, Ky., 3.76 in.; Anna, Ill., 5.08 in. in 12 hours, total of 6.14 in. in 21 hours; Louisville, Ill., 3.00 in. in 12 hours; 25th, Atlantic City, N. J., 2.08 in.; Pittsburgh, Pa., 2.59 in.; Dover, Del., 25th, and 26th, 2.50 in.; Arlington Ind., 24th, and 25th, 2.75 in.; Vevay, Ind 23rd, to 25th, 4.45 in. in 42 hours; St. Meinrads, Ind., 23rd, to 25th, 4.75 in.; Highlands, N. C., 24th, and 25th, 3.47 in.; Wellsburgh W. Va., 2.87 in. in 6 hours; 26th, St. Marks, Fla., 4.46 in.; Accotink, Va., 1.00 in. in 3 hours; 30th, Gulf Hammock, Fla., 2.60 in.; Moorestown, N. J., 17th, 2.78 in. in 24 hours; 17th to 19th, 4.31 in.; Acto, N. J., 16th to 18th, 7.23 in.; Somerville, N. J., 15th to 18th, 5.56 in. in 74 hours; South Orange, N. J., 15th to 18th, 4.60 in.; Vineland, N. J., 16th to 18th, 4.60 in. in 78 hours; Freehold, N. J., 16th to 18th, 7.56 in., of which 5.34 in. fell in 24 hours; Trenton, N. J., 15th to 18th, 5.8 in., of which 4.58 in. fell within 36 hours; Wappinger's Falls, N. Y., 16th to 19th, 3.75 in. in 72 hours; Penn Yan, N. Y., 16th to 19th, 2.60 in. in 18 hours; Ardenia, N. Y., 15th to 18th, 3.30 in. in 72 hours; Boyd's Corner, N. Y., 15th to 18th, 3.68 in. in 7½ hours; Lenoir, N. C., 15th, 16th, 5.50 in. in 43 hours; Fayetteville, N. C., 16th to 18th, 6.00 in., of which 3.00 fell in 18 hours; Greensboro, N. C., 17th, 2.90 in. in 7 hours and 30 minutes; Urbana, Ohio, 15th, 2.06 in. in 20 hours; Little Mountain, Ohio, 15th, 16th, 2.20 in. in 29 hours; Cleveland, Ohio, 16th, 2.46 in. in less than 24 hours; Bethel, Ohio, 15th, 16th, 3.50 in. in 44 hours; Mt. Solon, Va., 15th, 17th, 3.85 in., of which 2.40 in. fell in 4 hours; Accotink, Va., 16th, 18th, 3.05 in., of which 1.60 in. fell in one day; Lake Village, N. H., 18th, 19th, 3.05 in.; Weir's Bridge, N. H., 16th to 19th, 4.08 in.; Belmont, N. H., 17th, 18th, 3.75 in.; Wolfeboro, 18th, 19th, 2.54 in.; Dover Mine, Va., 17th, 18th, 2.45 in. in 16½ hours; Johnstown, Va., 18th, 7.70 in. in 11 hours; Fallsington, Pa., 18th, 2.48 in. in 13 hours, 6.01 in. from 15th to 18th; Egypt, Pa., 18th, 2.80 in.; White Plains, N. Y., 15th to 18th, 4.80 in., of which 3.90 in. fell in 15 hours; Dunbarton, N. H., on the night of the 18th, 3.12 in.; Southington, Conn., from 16th to 19th, 5.40 in.; Sandy Springs, Md., from 15th to 17th, 4.23 in.; Hulmville, Pa., 16th to 18th, 4.08 in.; Fort Hamilton, N. Y., from 9:00 p. m. of 17th to 9:00 p. m. of 18th, 5.00 in.; Philadelphia, Pa., 16th to 18th, 5.84 in.; Gainesville, Ga., 2.58 in. in 7 hours; Vevay, Ind., 14th to 16th, 3.65 in., (2.95 in. in 13 hours); Rowe, Mass., 18th, 19th, 2.40 in. in 24 hours; New Market, Md., 17th, 2.79 in. in 36 hours; Lawrence, Mass., 16th to 19th, 5.78 in.; Westborough, Mass., 16th to 19th, 5.47 in. in 70 hours; Somerset, Mass., 18th, 2.36 in. in 15 hours; Mystic, Conn., 18th, 3.00 in.; Dover, Del., 16th to 18th, 7.60 in. in 57½ hours; Newburyport, Mass., 16th to 19th, 4.22 in. in 74 hours; Mystic, Conn., 18th, 1.90 in.; West Waterville, Me., 16th to 19th, 5.25 in.; Mt. Desert, Me., 16th to 19th, 3.10 in.; Gardiner, Me., 16th to 19th, 4.62 in.; Orono, Me., 16th to 19th, 4.80 in.; Mendon, Mass., 16th to 18th, 6.20 in.; Clinton, Mass., 16th to 19th, 5.29 in. in 68 hours; Fall River, Mass., 16th to 19th, 3.40 in. in 66 hours; Springfield, Mass., 16th to 19th, 5.89 in. in 73 hours, 4.28 fell within 24 hours; Antrim, N. H., 16th to 19th, 4.12 in. in 70 hours.

Largest Monthly Rain-falls.—Ft. Barrancas, Fla., inches 25.07; St. Marks, 18.09; Cape May, 16.58; Atlantic City, 14.67; Fayetteville, N. C., 13.25; Gulf Hammock, Fla., 12.77; Punta Rasa, 12.75; Laredo, Tex., 12.59; Arma, Ill., 12.51; Dover, Del., and Franklin, N. C., 12.45; Sandy Hook, 12.44; Barnegat, 12.33; Pt. Pleasant, La., 12.28; Cape Lookout, 11.90; Rio Grande, Tex., 11.75; Cincinnati, 11.72; Bethel, Ohio, 11.62; Wilmington, 11.37; Johnstown, Va., 10.85; Vineland, N. J., 10.63; Mobile, 10.54; New Orleans, 10.44; Centreville, Mo., 10.27; Louisville, Ky., 10.02; Summit of Mt. Washington, 9.55; Ft. McKavett, 7.54.

Smallest Monthly Rain-falls.—Within the line marked zero on chart No. III, including portions of California, Nevada and Arizona, rain has only been reported at two stations, viz; Campo, 0.10 and San Geronia, 0.22; no rain fell at Clark's Fork in central Missouri. The following are the smallest monthly rain-falls reported: 0.01 inch at Carson City, Nev.; 0.02 at San Francisco; 0.03 at Boise City and Umatilla; 0.05 at Knight's Landing and Willows, Cal.; 0.06 at Williams, Cal., Salt Lake City and St. George, Utah; 0.14 at Winnemucca; 0.16 at North Platte; 0.18 at Leavenworth; 0.23 at Virginia City; 0.28 at Red Bluff; 0.4 at Corsicana. East of the Mississippi the lowest rain-falls reported are: 0.64 inch at Port Huron; 0.73 at Ithaca, N. J.; 1.40, Neillsville, Wis; and 1.60 at Decatur, Ala.

Rainy Days.—The number of days during which rain or snow has fallen varies as follows: New England, from 8 to 14; Middle Atlantic States, 10 to 16; South Atlantic States, 10 to 20; East Gulf States, 16 to 18; West Gulf States, 3 to 13; Ohio valley and Tennessee, 5 to 12; Lower Lake region, 8 to 11; Upper Lake region, 5 to 12; Upper Mississippi valley, 8 to 12; Missouri valley, 4 to 11; Red River of the North, 7 to 8; Eastern Rocky Mountain slope, 1 in northern Texas and 4 in western Nebraska to 7 in southwestern Dakota; Rocky Mountains, 2 to 13 and on Pike's Peak, 20; Western Plateau, 4 in Idaho and Utah and 5 in central Arizona to 6 in southeastern Nevada; California, 0 to 2; coast of Oregon and Washington Territory, 3 to 9.

Cloudy Days.—The number varies in New England from 7 to 14; Middle Atlantic States, 6 to 14; South Atlantic States, 7 to 17; East Gulf States, 7 to 13; West Gulf States, 2 to 7; Lower Lake region, 5 to 10; Upper Lake region, 4 to 10; Ohio valley and Tennessee, 6 to 11; Upper Mississippi valley, 6 to 7; Missouri valley 1 to 5; Red River of the North, 2 to 4; eastern Rocky Mountain Slope, 1 in northern Texas, and 2 in southeastern Dakota to 6 in Kansas and Nebraska; Rocky Mountains 0 to 9; North

and Middle Plateau, 2 to 3; Southern Plateau, 0 to 1; California, 0 to 3; coast of Oregon and Washington Ty., 6 to 11.

Hail—But few hail-storms have been reported during the month. The only stations reporting more than one storm are: Pikes Peak, 6; Summit, Col., 7; De Soto and Omaha, Neb., 3. Two states report two separate storms in one day, on the 12th at Ames and Monticello, Iowa; 23rd Bellefontaine and Jacksonburg, Ohio. Hail fell 1st, at Cincinnati and Buffalo; 2nd, Chicago; 6th, Georgetown, Col., Kansas City, Mo., and Wellington, Kan.; 12th, Milwaukee, "large enough to kill fowls;" 13th, Lawrence, Kan.; 14th, Yankton, Dak.; 16th, Chambersburg, Pa.; 21st, Wilsonville, Ala.; 22nd, Mt. Washington; 23rd, Corning, Mo., and Freehold, N. J.; 28th, Ft. Keogh, Montana, large size and doing much damage. No hail was reported west of the Rocky Mountains.

Snow—Red Bluff, Cal., 21st, on coast range; on the summit of Pike's Peak, 4th to 6th, 7th, 12th, 13th, 15th, 16th, 19th to 21st, 28th and 29th; Virginia City, 29th, on mountains near; Summit, Col., 13th, 16th, 28th; Carson City, Nev., 28th, on mountains near; Burlington, Vt., 17th, on mountains near, two inches; Mt. Bridger, near Ft. Ellis, Montana.

Droughts—Throughout the month droughts were reported as existing in Utah, the Lower Missouri valley, the Upper Mississippi valley, northeastern part of Pennsylvania, and southeastern Michigan. Droughts commencing late in the month continued on the 31st in eastern Wisconsin, northeastern Illinois and Indiana. The droughts reported as prevailing in Nevada and Texas at the end of July ended in Nevada, excepting in the Humboldt valley, on the 1st of August; in Texas from the 9th to the 12th, except in Navarro county, where creeks and tanks were reported dry and stock suffering dreadfully at the end of August. On Carson river, Nevada, all mills were reported shut down on 22nd, for lack of water.

Floods and Water-spouts—3rd, near Milton, Pa., on the west branch of the Susquehanna; 11th, water-spout at entrance to Pensacola Bay, at 11.20 a. m., course from southwest to northeast; 16th, Mayport, Fla., moved over the sea from southwest to northeast for about four miles, and then broke; 12th to 14th, high water in the Rio Grande river overflowing the valley between Rio Grande City and Brownsville, doing considerable damage.

RELATIVE HUMIDITY.

The percentages of mean Relative Humidity for the month range as follows: New England, 65 to 87; Middle Atlantic States, 71 to 83; South Atlantic States, 69 to 84; Gulf States, 69 to 85; Ohio valley and Tennessee, 62 to 77; Lower Lakes, 64 to 72; Upper Lakes, 63 to 70; Upper Mississippi valley, 61 to 68; Lower Missouri valley, 60 to 65; Red River of the North valley, 63 to 76; Rocky Mountain Slope, 49 to 66; Plateau districts, 22 to 70; California, 31 to 78; Oregon, 33 to 59. *High stations* report the following averages, not corrected for altitude: Mt. Washington, 83.9; Pike's Peak, 52.3.

WINDS.

The prevailing winds, at the Signal Corps stations, are shown by the arrows flying with the wind on chart No. II. The *maxima velocities* per hour have been given in the descriptions of movements of areas of low pressure.

Total movements of the air—The following were the *largest* monthly movements in miles recorded at the Signal Corps stations: Mt. Washington, 18,638; Cape Lookout, 12,656; Portsmouth, N. C., 11,954; Kittyhawk, 18,982; Cape Hatteras, 10,501; Pikes Peak, 10,470; Sandy Hook, 9,613; Cape May, 9,406; Barnegat, 9,213; Dodge City, 8,661; Indianola, 8,554; San Francisco, 8,264; North Platte, 8,111. The smallest movements were: Silver City, N. M., 848; La Mesilla, 1,148; Fredericksburg, Texas, 1,818; Nashville, 1,920; Graham, 1,928; Lynchburg, 2,019; Tucson, 2,051; Roseburg, 2,144; Deadwood, 2,254; El Paso, 2,322; Visalia, 2,374.

Local Storms—On the 3rd a heavy wind storm at Phoenix, Arizona. 14th, heavy storm at Portland, Maine, blowing down houses, uprooting trees &c., in the adjoining country. From the 17th to the 19th a series of violent storms were reported along the Atlantic coast from South Carolina to Maine in connection with the cyclone which then passed along the coast. 22nd, Biloxi, Miss., whirlwind about one hundred feet wide passed through the centre of the Sea Shore Camp Grounds, demolishing five cabins and taking off a portion of the roof of the tabernacle, scattering it some three hundred feet. Large oak trees were lifted out by the roots and in some instances broken off short. One person fatally and one seriously injured. On the 28th, at 4.20 p. m. a violent gale from the northwest occurred at Fort Keogh, Montana. The wind attained a velocity of 52 miles at 4.45 p. m., and was accompanied by heavy rain and large hailstones, the latter doing much injury. Several buildings were seriously damaged. The storm lasted 35 minutes.

VERIFICATIONS.

Indications—The detailed comparison of the tri-daily weather indications for June with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of omissions to be 2.44 per cent, and of verifications to be 84.0 per cent. The percentages for the four elements have been, Weather, 92.4; Direction of the Wind, 84.1; Temperature, 83.6; Barometer, 74.7. The percentages of verifications by geograph-

ical districts have been: New England, 85.9; Middle States, 86.6; South Atlantic States, 81.9; East Gulf States, 85.0; West Gulf States, 84.7; Lower Lake region, 85.8; Upper Lake region, 82.6; Tennessee and the Ohio valley, 84.5; Upper Mississippi valley, 81.0; Lower Missouri valley, 80.3; Northern Pacific coast region, 85.8; Central Pacific coast region, 95.7; Southern Pacific coast region, 100. Of the 3,720 predictions that have been made, 162, or 4.4 per cent, are considered to have entirely failed; 131, or 3.5 per cent, were one-fourth verified; 484, or 13.0 per cent, were one-half verified; 360, or 9.7 per cent, were three-fourths verified; 2,583, or 69.4 per cent, were fully verified, so far as can be judged from the tri-daily weather maps.

Cautionary Signals.—87 Cautionary Signals were displayed during the month, of which 73, or 83.9 per cent., were justified. 13 Cautionary Off-shore Signals were displayed, which were all fully justified both as to direction and velocity. 75 cases of winds of over 25 miles per hour were reported, when signals were not ordered. The above does not include signals ordered at 47 display stations where the velocity is only estimated and not measured.

NAVIGATION.

In the table, on the right-hand side of chart No. III, are given the highest and lowest readings on the Signal Corps river-gauges for the month, with the dates. The rivers in general remained quite low and falling throughout the month and in no case did the water reach the danger-line. The only important freshets were those following the heavy rains attending storm-area No. IX, in the Red, Arkansas, and Lower Ohio rivers. On the 23rd the water in the Upper Mississippi was so low as to interfere with navigation north of La Crosse.

High Tides.—15th, Toledo highest of the season, very near the highest point ever known; 17th, Cape Lookout; 18th, Macon and Portsmouth, N. C., and Cape May and Atlantic City N. J.; 21st, Galveston; 28th, Mayport, Fla.; 31st, Indianola, Texas.

Low Tides.—1st to 3rd, Indianola, Texas.

Tidal Waves.—18th, at Fisk's Mills, Sonoma county, Cal.; four persons drowned.

TEMPERATURE OF WATER.

The temperatures of water, as observed in rivers and harbors, with average depth at which the observations were taken, are given on chart No. II. No observations were taken during the month at San Francisco owing to the breakage of the thermometer. At Milwaukee the minimum temperature for the month is omitted as the reports for several days during the month indicated that the thermometer was out of order. The following reports were received too late to be incorporated in the regular table: Punta Rasa maximum temperature at bottom 91°, minimum temperature at bottom 79°, average depth of water 12.3 feet.

ATMOSPHERIC ELECTRICITY.

Thunder-storms.—Thunder storms have been reported in too large numbers during the past month to permit their enumeration in detail. They have been reported on the greatest number of days, in the following states, viz: Iowa 17; Ohio and North Carolina, 14; Illinois, 13; Indiana, Massachusetts and New Jersey, 10; Florida and Nebraska, 9; Summit, Col., (elevation 11,300) reported such storms on 14 days; Pikes Peak on only 3 days. On 5th, 6th, 14th and 22nd they were frequent in the Ohio Valley; on 16th, 17th, 21st and 22nd in the Middle and South Atlantic States; on 22nd and 29th, in New England; on the 10th, 11th and 12th in the Upper Mississippi and Lower Missouri Valleys; on the 14th, thunder-storms generally in New England and at isolated stations in New York, New Jersey, Pennsylvania, Ohio and Indiana. But two such storms have been reported west of the main range of the Rocky Mountains, at Phoenix and Tucson, Arizona.

Auroras.—Five auroras have been reported during the month; that of the night of 1st and 2nd was noticed at Burlington, Vt., where it appeared as a well defined dark segment of an emerald green; that of the 6th was seen at New Corydon, Ind., at 9 p. m., at Oregon, Mo., dark to 10 p. m., diffused light, and at Urbana, Ohio, from 6 p. m., as reddish light, becoming white at 9 p. m., and ending at 9:30 p. m.; that of the 9th was observable from Burlington, Vt., on the east to Alpena, Breckenridge and Bismarck on the west. At Breckenridge at 9:55 p. m., bluish colored streamers shot out along the whole length of the lower arch and extended from one to ten degrees along the upper arch; at 10 p. m. only a faint light remained; that of the 7th at Oregon, Mo., from dark to 10 p. m., no streamers; that of the 23rd was observed at Newburyport, Mass., where it was quite faint, and at Gardiner, Me., at which place it was visible from 10 p. m. to midnight; also at Alpena, Mich.

Atmospheric Electricity Interfering with Telegraphic Communications.—Pembena, 1st and 24th; Phoenix Ariz., 3rd; in Texas, at Eagle Pass, 3rd, 4th, 7th, 15th and 19th; at Brackettville, 4th and 6th; at Graham and Jacksboro on the 7th; Castroville, 6th, 7th and 15th; Rio Grande City, 8th; Brownsville, 15th; Mason, 17th; Fort Sill, 6th; Santa Fé, 5th, 6th, 9th, 13th, 14th, 16th, 18th; Pike's Peak, 12th, remarkable display; Macon, N. C., 8th.

Magnetic Variation.—Prof. F. Hess reports the variation of the magnetic needle on the 9th, about 10 p. m., in the San Juan Valley, Colorado, as "14° 34'."

OPTICAL PHENOMENA.

Solar Halos.—But few were reported in comparison with previous months. None with any remarkable phenomena attending were reported.

Lunar Halos.—But few lunar halos were reported, the largest number, 6, from Dubuque, Iowa. That of the 24th was observed at several stations in Iowa and Illinois, but no particular phenomena in connection therewith was reported.

MISCELLANEOUS PHENOMENA.

Lightning at Visalia, Cal., 18th.

Sand-storms at Coleman, Texas, 4th and Visalia, Cal., 26th.

Grasshoppers.—Air full of them, moving south on 31st at Holton, Kansas. Shasta valley overrun with them early in month; they devoured everything green, and crops suffered much from them. Martis valley, Truckee river, vegetation completely destroyed by them, requiring cattle range to be abandoned for the season.

Mirage.—Henrietta, Texas, 3rd; Olivet, Dak., 7th, 24th and 31st; Breckenridge, Minn., 9th, 22nd; Pembina, Dak., 29th.

Prairie Fires.—Ft. Gibson, Ind. Ty., 2nd, 14th; Burlington, Vt., 2nd, 5th to 10th, 12th to 14th; Boise City, Idaho, 4th to 9th, 13th to 17th; Near Salt Lake City, 8th to 20th, 27th; Creswell, Kan., 8th, 9th, 23rd, 31st; Port Huron, 27th; 1st, southeast of San Jose, Cal.; 1st to 7th, Yuba river valley, Cal.; 3rd, Stanislaus co., Cal.; 4th, Santa Clara, co., Cal.; 6th to 20th, near Verdi, Nev., doing much damage; 11th to 23rd, Calaveras Co., Cal., "hundreds of acres of thrifty young timber destroyed."

Sunsets.—the characteristics of the sky at sunset, as indicative of fair or foul weather, for the succeeding, twenty-four hours, have been observed at all Signal Corps stations. Reports from 129 stations show 4,892 observations to have been made, of which 34 were reported doubtful; of the remainder 4,858 or 66.6 per cent were followed by the expected weather.

Meteors.—Meteors were reported in considerable numbers, being most general from the 9th to the 11th and from 19th to 22d. The largest numbers were reported from Indiana, Maryland, New Jersey and New York. None were reported west of the 100th meridian, except at Georgetown, and San Juan Valley, Col., on the 5th 10th, (on which date they were very numerous in Indiana and Colorado), and 23d, and at Tucson, Ariz., on the 9th.

Earthquakes.—On the 10th, 1:15 p. m., very slight at Los Angeles, California. The motion was more perceptible at Santa Monica, about 13 miles distant, and a tidal wave which followed was attributed to it. At San Fernando the shock was quite severely felt. At 12:30 p. m. of the 21st, at Buffalo, New York, a light shock followed by others, from 1:20 to 1:32 p. m., attended in latter case by a rumbling sound. August 21st, in Ontario, at Niagara, St. Catherines, Thorald, Welland, Allanburg, Port Dalhousie and Beausville. It was the most violent at St. Catherines at 2:55 a. m., duration estimated from two to ten seconds; movement was from east to west. At Lockport, N. Y., a shock was felt at 4:30 p. m. (lasting five seconds) with very loud report.

Sun Spots.—The following record of observations, made by D. P. Todd, Assistant, has been forwarded by Prof. S. Newcomb, U. S. Navy, Superintendent Nautical Almanac, Washington, D. C.:

DATE— AUGUST, 1879.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		REMARKS.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
10th, 2 p. m...	1	4	0	0	0	0	1	4	
10th, 3 p. m...	0	0	0	0	0	0	1	4	
12th, 4 p. m...	1	10	0	0	0	0	2	14	
12th, 5 p. m...	0	0	0	0	0	0	2	14	Faculae.
14th, 5 p. m...	0	0	1	12	0	0	1	2	
16th, 3 p. m...	0	0	1	2	0	0	0	0	Faculae.
20th, 4 p. m...	1	1	0	0	0	0	1	1	Faculae.
21st, 5 p. m...	0	0	1	1	0	0	0	0	Faculae.
24th, 5 p. m...	1	12	0	0	0	0	1	12	
27th, 3 p. m...	1	8	0	4	1	8	2	11	Faculae.
28th, 3 p. m...	0	0	0	1	0	0	2	10	Faculae.
30th, 5 p. m...	0	0	1	2	0	0	1	3	{ The eight spots of the group which re-appeared on the 27th, have coalesced into three spots, one of them quite large.
31st, 2 p. m...	0	0	0	0	0	0	1	3	

Faculae were also observed on the 2nd at 2 p. m. and on the 3rd at 3 p. m.; observations were made but no spots observed on the 1st at 2 and 5 p. m., 5th and 6th 3 p. m., 8th at 2 p. m., 18th at 6 p. m. and on the 19th at 4 p. m. Mr. David Trowbridge at Waterburgh, N. Y., reported 1st to 9th, 11th to 13th, 19th to 23rd and 27th, no spots perceptible; 10th, 7:30 a. m. small spot about one-fifth diameter from west margin of disc not visible on the 9th at 3:30 p. m. or on the 11th at 6:30 p. m.; 24th, a group of 2 or more small spots a little east of the center of disc; 28th, a group of 2, one well defined, near eastern margin; 30th, 2 spots; 31st, one spot which was still visible on Sept. 1st. Mr. Wm. Dawson at Spiceland, Ind., reported 1st, 2nd, 4th, 7th to 9th and 17th to 21st, no spots; 10th, 8 spots in one group, one spot about half-way from center to western edge; 11th, 15 spots in two groups—new group of 5 little spots in NW.

quadrant; 12th, 29 spots in two groups, the northern group having 23 spots, 5 prominent, increased wonderfully in past 24 hours; 13th, 14 spots in two groups; 14th, 9 spots in 2 groups very near western edge; faculae in both; 22nd, 3 small spots in one group about one-sixth of sun's diameter east of center; 25th, about 15 spots in one group between center and west edge; 26th, 13 spots in 2 groups, new group of 5 spots at east edge; 27th, 21 spots in three groups; western group has 3 spots, one large; eastern group has 15 spots, finely prominent and filled with faculae; third group, near southeast margin, has 3 little spots; 28th, 22 spots in 2 groups, 20 spots, one large, in eastern group, southeast group disappeared; 29th, 26 spots in 2 groups, eastern group 18 spots; one group of eight small spots away south; 30th, 16 spots in eastern group, southern group disappeared; 31st, 19 spots in 2 groups; two little spots in faculae near east edge. Mr. J. Harcourt, at Wappinger's Falls, N. Y., reports:—10th, one group of 6 spots; 31st, at 8 a. m. and 2 p. m. one large spot and a small group. Mr. F. Hess, at various points in the San Juan Valley, Colorado, 10th, and 11th, one large and three small spots; 24th, 6 a. m., group of 9 spots near sun's center; 27th, 5 p. m. one large and one small spot near northeast limit; 28th, one large and two small spots near southeast limit; 29th, to September 6th, one large and one small spot; sun examined but no spots seen on the 25th. Observations were made throughout the month at Fort Whipple, Va., but no spots seen.

NOTES AND EXTRACTS.

[From *Nature*, August 11th, 1879.]

The statistical review of volcanic phenomena during 1878, which Prof. Fuchs has recently published, and which forms the continuation of many previous statistical accounts of the same nature, shows the unusually large number of *twelve* eruptions in the course of the year. Most of them occurred in remote localities and gave evidence of the activity of volcanos which were generally but little known and which are all difficult of access." The following eruptions are mentioned in *Nature's* article: Mt. Vesuvius became active April 20th. A small flow of lava took place at the end of September and from November 1st to 9th.

Active and hitherto unknown volcanos were seen at the southern point of South America from January 10th to 18th. A great eruption occurred in Tanna Island, New Hebrides, on January 10th, lasting a short time and accompanied by a mighty tidal wave which inundated a great part of the Island. A second outbreak followed February 4th. Early in February an eruption happened in the island of Birara, group of New Britian. "The third eruption of February took place from the volcano Isluga in South America, * * accompanied by a fearful earthquake, and so great were the masses of lava ejected, that villages * * more than five leagues distant from the volcano, were completely destroyed by the incandescent streams. Smaller eruptions occurred from Mt. Hecla during March; from Asamayama, Japan, and Cotopaxi in October; from Tapaco, the Situa and the Isalco in San Salvador." Important eruptions took place in the volcanic series of the Aleutian Islands. Raiten and Borabora, Society Islands are reported completely devastated by volcanic action. The well known mud volcano near Paterno, Sicily, was in eruption from December 10th to 31st, remaining active at the end of the year.

"The number of earthquakes reported during 1878, amounts to 103," in which only complete earthquake periods are counted. The most violent and destructive took place January 23rd, in Peru and Bolivia. That of October 2nd, in southern part of San Salvador, was also very violent."

European Earthquakes.—January 28th, North-western France and Southern England, January 16th, North-western Switzerland with repeated shocks. Other repeated earthquakes at Innsbruck January 3rd, 10th, 11th, February 2nd, August 9th; Gross Gerau, January 2nd and March 25th; Lisbon, January 26th, 27th and June 8th; Premont repeated shocks, November 25th; Constantinople, Ismid and Brussa, from 19th to end of May. The Low Rhenish earthquake August 28th affected over 2,000 geographical square miles including Arnsbergh and Hanover in the north, Michelstadt and Odenwald to the south-east, Strassburg and Paris in the south, Brussels in the west and Utrecht in the north-west. "It is remarkable that the phenomenon was only noticed at the surface, * * not one of the eleven hundred miners working at a depth of three hundred metres at Altessen noticed the least shock."

[From *Nature* August 7th, 1879.]

"Geneva Society of Physics and Natural History, March 6th. M. Ph. Plantamour observed during the cyclone of February 20th, a notable depression of level of the lake of Geneva. The wind produced this effect of depression notwithstanding the diminution of atmospheric pressure indicated by the barometer, and which would tend to raise the level of the water."

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

Brig. Gen. (Bvt. Assg^d.) Chief Signal Officer, U. S. A.

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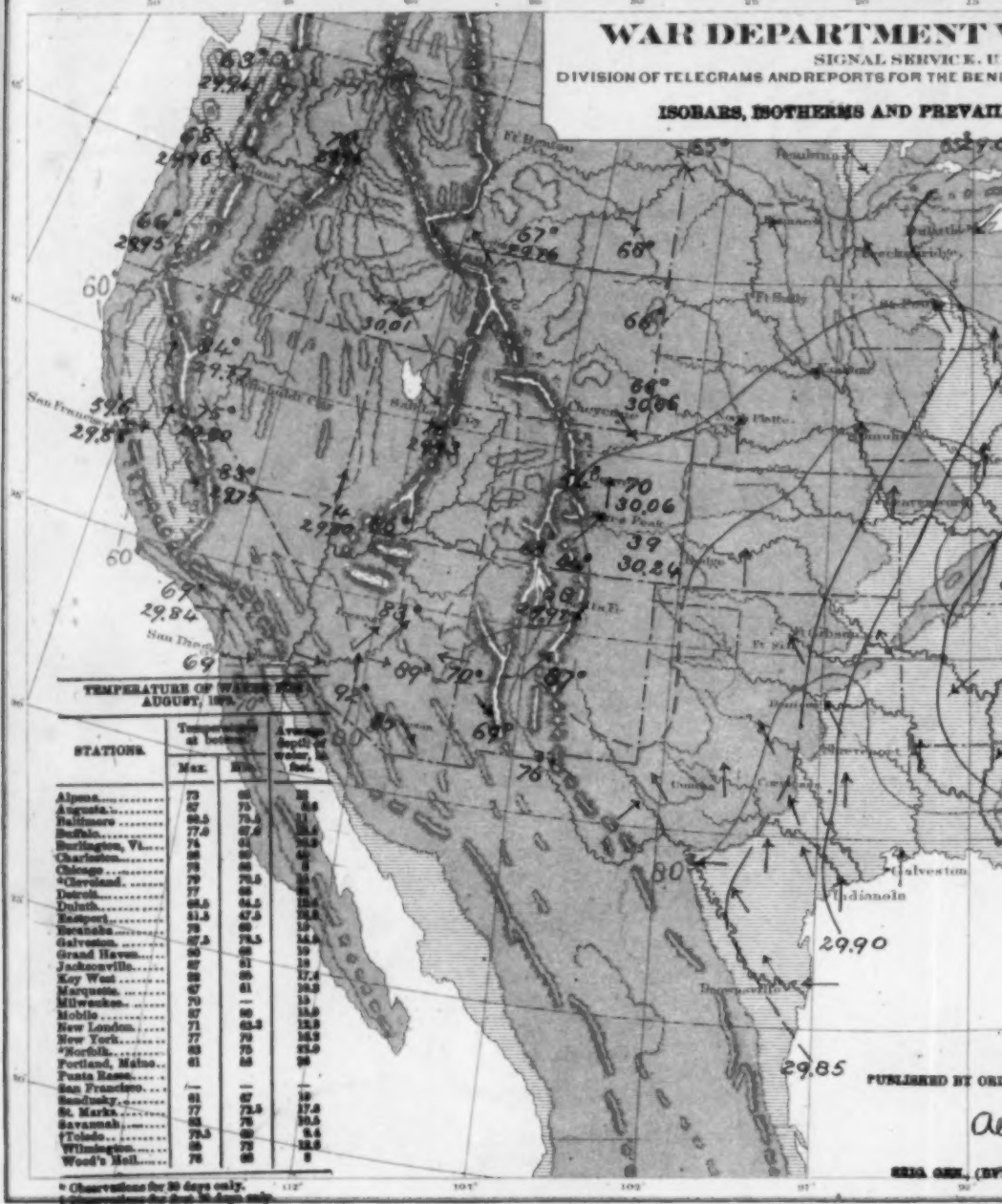




WAR DEPARTMENT

SIGNAL SERVICE, U. S. ARMY
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF THE

ISOBARS, ISOTHERMS AND PREVAILING WINDS



* Observations for 30 days only.
† Observations for last 10 days only.

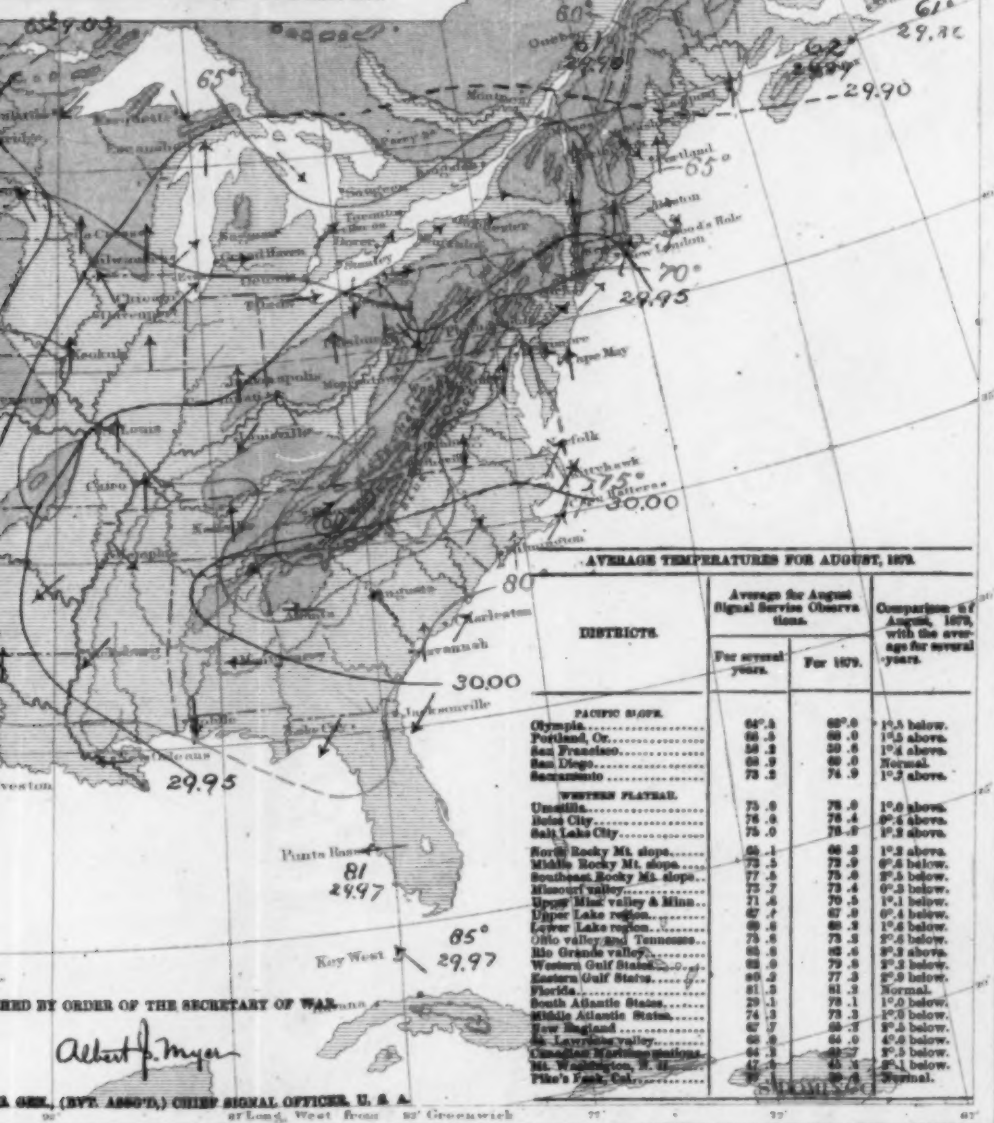
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2212 G. H. (27)

PRESENT WEATHER MAP.

BY THE U. S. ARMY.
FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PREVAILING WINDS FOR AUGUST, 1879.



AVERAGE TEMPERATURES FOR AUGUST, 1879.

DISTRICTS.	Average for August Signal Service Observa- tions.		Comparison of August, 1879, with the average for several years.
	For several years.	For 1879.	
PACIFIC SLOPE.			
Olympia.....	64°.5	65°.0	1.5 below.
Portland, Or.....	60.3	60.0	1.5 above.
San Francisco.....	58.3	59.5	1.2 above.
San Diego.....	68.9	68.0	Normal.
Sacramento.....	73.2	74.9	1.7 above.
WESTERN PLATEAU.			
Omaha.....	75.0	76.0	1.0 above.
Keokuk.....	74.0	75.4	1.4 above.
Salt Lake City.....	73.0	73.8	0.8 above.
North Rocky Mt. slope.....	66.1	66.3	0.2 above.
Middle Rocky Mt. slope.....	72.5	72.9	0.4 below.
Southeast Rocky Mt. slope.....	77.5	75.0	2.5 below.
Missouri valley.....	72.7	73.4	0.7 below.
Upper Miss. valley & Minn.....	71.4	70.5	0.9 below.
Upper Lake region.....	67.7	67.9	0.2 below.
Lower Lake region.....	69.6	69.3	0.3 below.
Ohio valley and Tennessee.....	75.6	75.3	0.3 below.
Ill. Grande valley.....	66.8	66.6	0.2 below.
Western Gulf States.....	68.0	70.8	2.8 below.
Florida.....	81.3	81.3	Normal.
South Atlantic States.....	79.1	78.1	1.0 below.
Middle Atlantic States.....	74.3	73.3	1.0 below.
New England.....	67.7	66.7	1.0 below.
St. Lawrence valley.....	66.0	64.0	2.0 below.
Canadian Maritime Provinces.....	64.3	62.7	1.6 below.
Mt. Washington, N. H.....	47.0	45.3	1.7 below.
Pike's Peak, Col.....	58.0	58.0	Normal.

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Albert F. Meyer

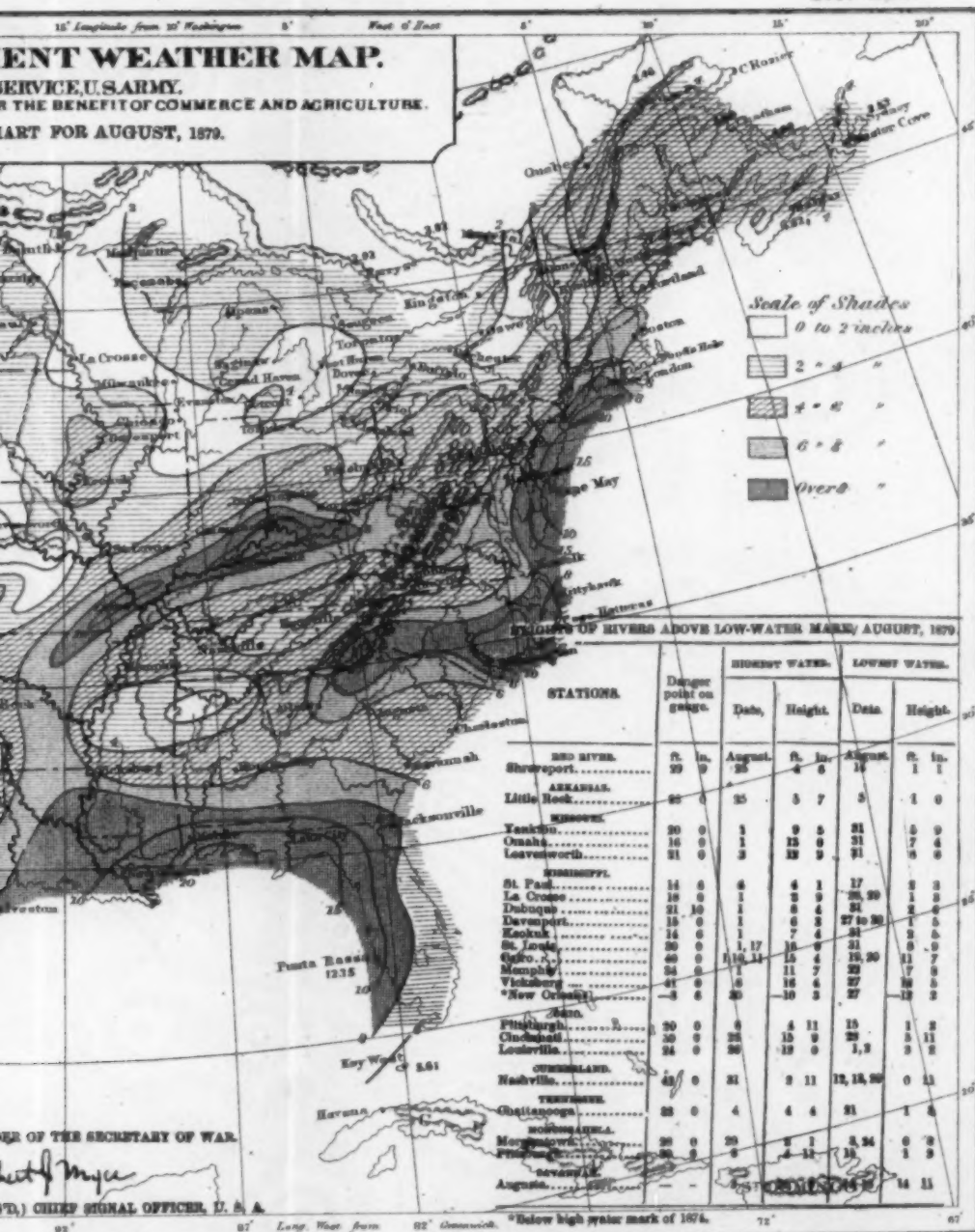
ALBERT F. MEYER, (BYE ASS'N), CHIEF SIGNAL OFFICER, U. S. A.

81 Long, West from 82° Greenwich

C. S. D. Lith. Washington D.C.

WAR DEPARTMENT
SIGNAL SERVICE
 DIVISION OF TELEGRAMS AND REPORTS FOR THE BEN
 PRECIPITATION CHART FOR





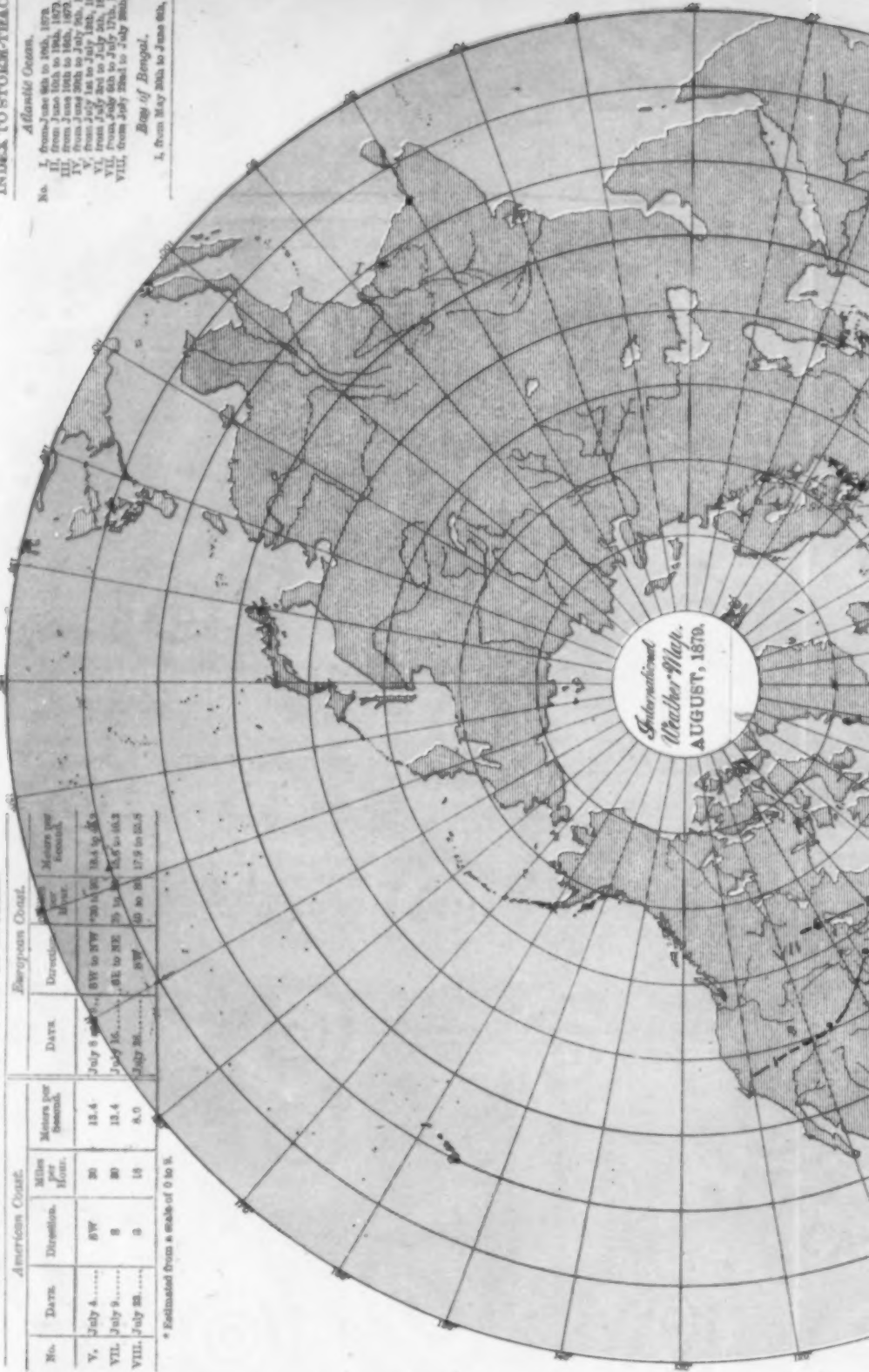
WINDS ACCOMPANYING THE ATLANTIC STORMS.

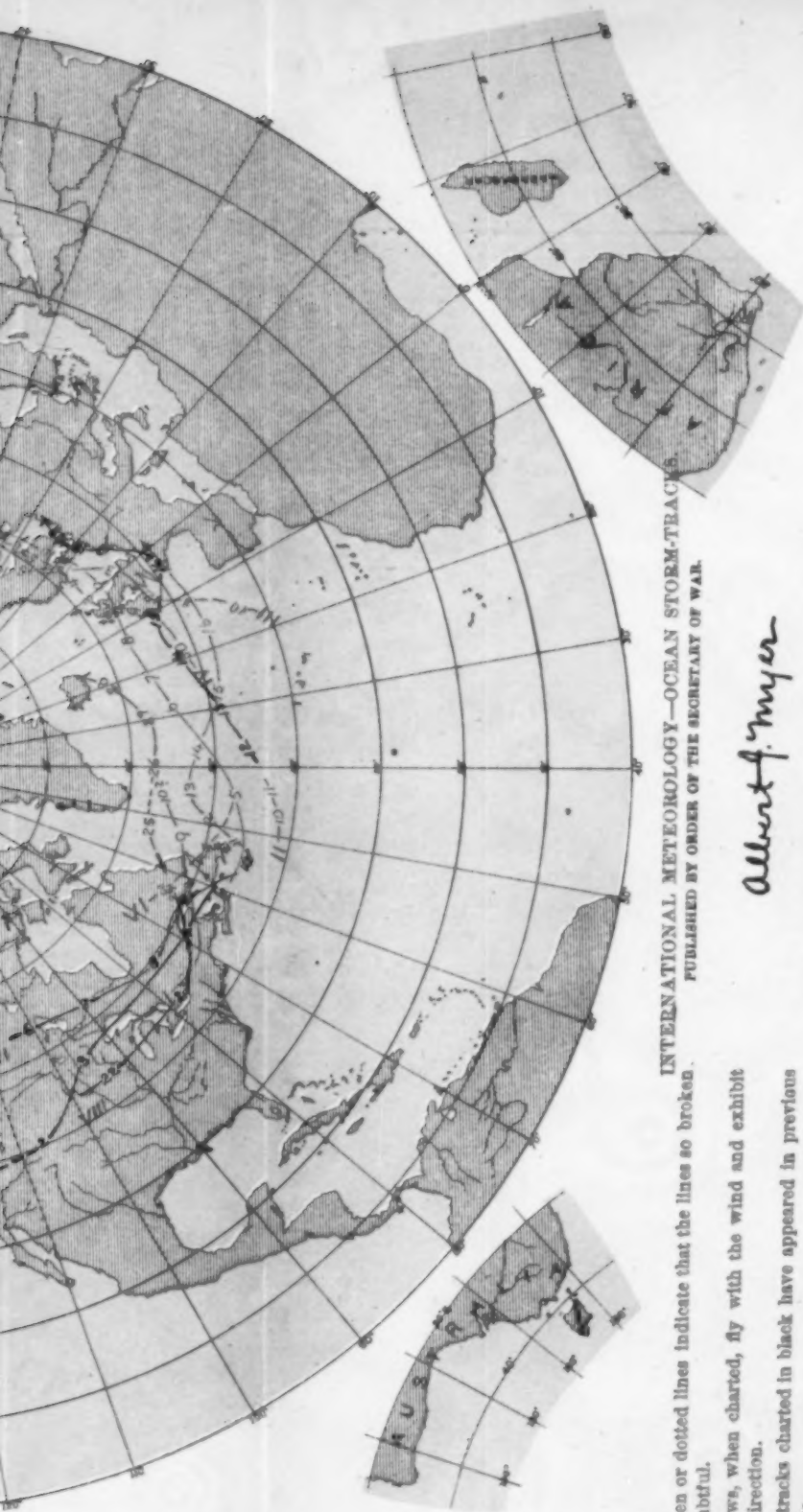
American Coast.			European Coast.		
No.	Date.	Direction.	Miles per hour.	Direction.	Miles per hour.
V.	July 4.....	SW	20	SW to NW	20 to 30
VII.	July 9.....	S	30	SE to NE	25 to 35
VIII.	July 23.....	S	10	SW	10 to 20

* Estimated from a scale of 0 to 9.

INDEX TO STORM-TRACKS.

Atlantic Ocean.	
No. I.	from June 24 to 30, 1878.
II.	from June 14 to 16, 1878.
III.	from June 14 to 16, 1878.
IV.	from June 14 to 16, 1878.
V.	from June 14 to 16, 1878.
VI.	from July 2 to 7, 1878.
VII.	from July 2 to 7, 1878.
VIII.	from July 2 to 7, 1878.
Bay of Bengal.	
I.	from May 24 to June 24, 1878.





INTERNATIONAL METEOROLOGY—OCEAN STORM-TRACKS.
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Broken or dotted lines indicate that the lines so broken are doubtful.

Arrows, when charted, fly with the wind and exhibit wind-direction.

The tracks charted in black have appeared in previous *Reviews*.

The tracks charted in red have been made from data collected since preceding *Review*.

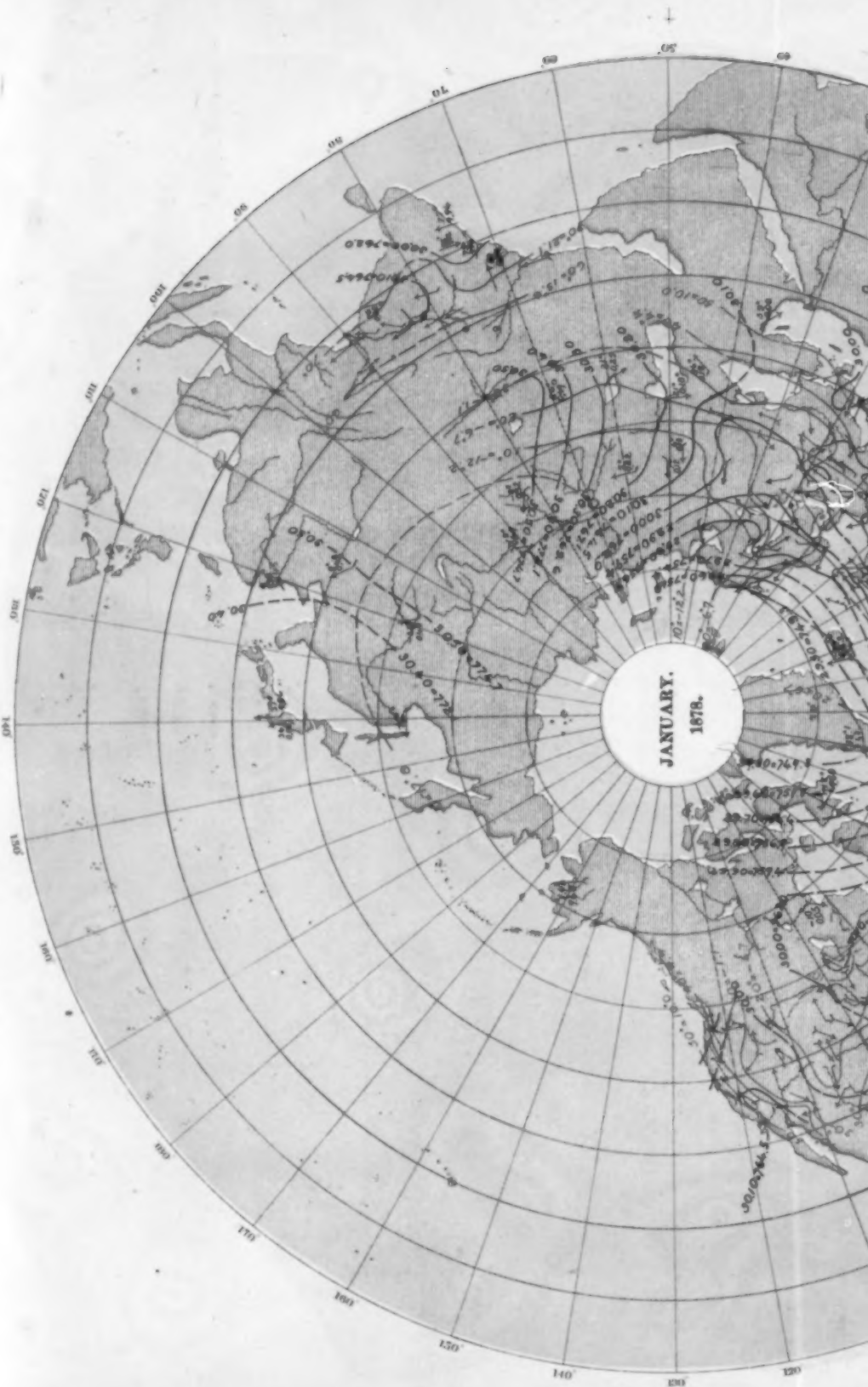
Albert F. Meyer

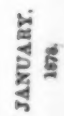
BRIG. GEN., (BVT. ASST. CHIEF SIGNAL OFFICER, U. S. A.)

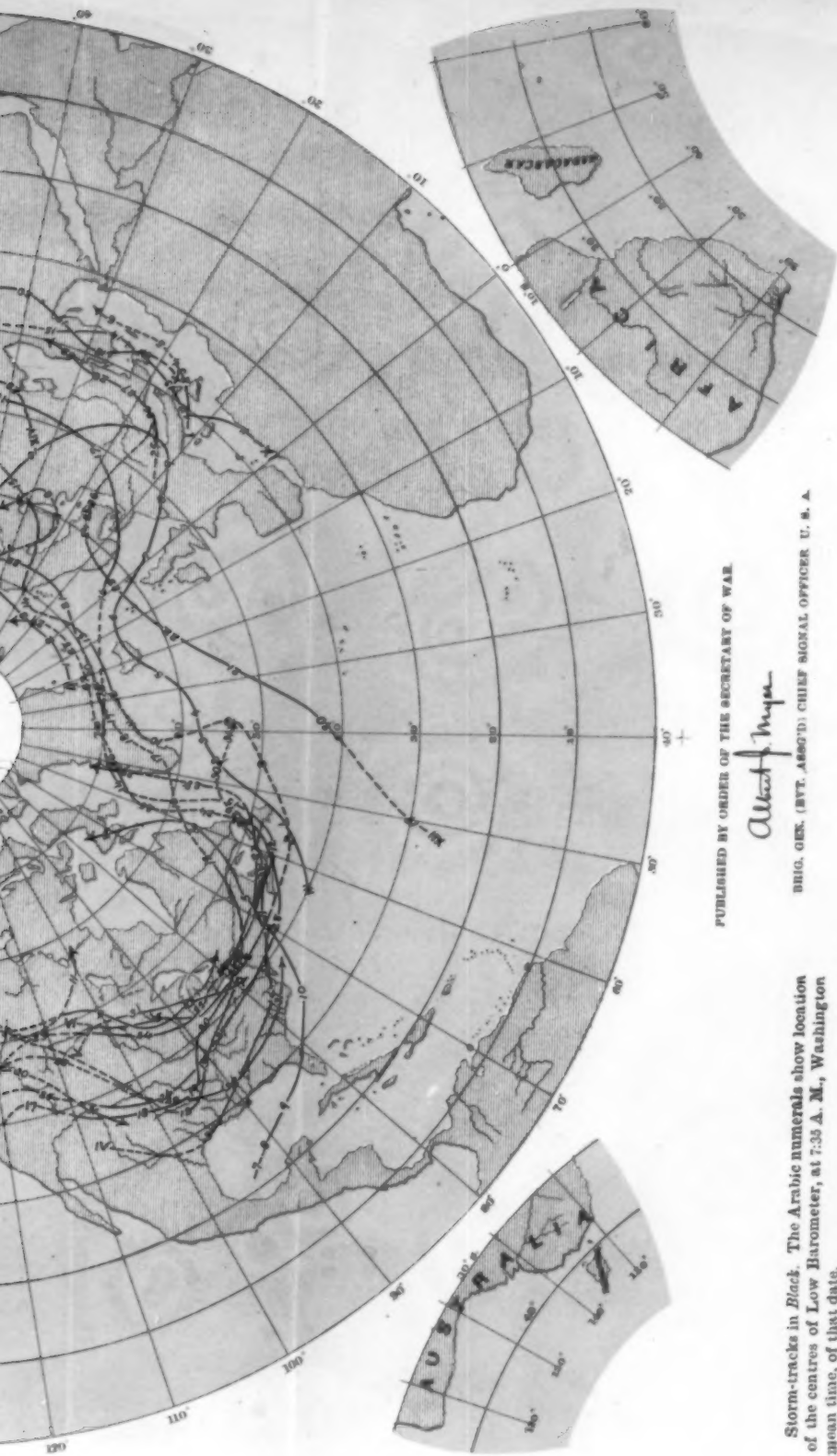
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No. V.

INTERNATIONAL MONTHLY CHART.
Showing mean pressure, mean temperature, mean force and prevailing direction of winds at
7:35 A. M., Washington mean time, for the month of January, 1878, based on
the daily charts of the International Bulletin.



$+$ 



PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

A. H. Meyer

BRIG. GEN. (EVT. ASST.) CHIEF SIGNAL OFFICER U. S. A.

Storm-tracks in *Black*. The Arabic numerals show location of the centres of Low Barometer, at 7:30 A. M., Washington mean time, of that date.

Broken or dotted lines, are doubtful.